FOOD INDUSTRIES

manufacturing and processing

McGRAW-HILL PUBLISHING COMPANY, INC.
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New York, April, 1929

VOLUME I . . . NUMBER 7

Co-operation of Manufacturers Will Cut Distribution Wastes

OUR YEARLY WASTE in distribution—moving all commodities from producer to consumer—has been estimated at slightly more than eight billions of dollars. Of this amount approximately one billion is due to credit losses. Here is a problem of waste elimination that challenges the best minds of the country. The reward for its solution is great enough to warrant the same intensive effort that has been devoted for the past decade to the solution of the problem of production, which has been closely studied from every angle. As a result, practices have been developed for the various industries so nicely attuned that variations of a fraction of a per cent in labor, raw materials, or general operating expenses can not only be predicted in advance, but actually are reflected in the final cost of any given commodity. The same condition does not exist in connection with the distribution of the products so manufactured.

THE food industries—the meat packer, the miller, the baker, the dairyman, the canner, the confectioner, and any other processer of food for human consumption, making up the more than forty-eight thousand plants producing nearly eleven billions of dollars in products annually—are extremely fortunate in having a very determined group of men in Louisville, Ky., co-operating with the United States Department of Commerce, seeking the answer to the distribution problem of the food industry, through a detailed study of wholesale, retail, and consumer practices in their own locality. The preliminary results of the study were discussed at a meeting of nearly 400 executives, representing the manufacturing, wholesaling, and retailing food, held in Louisville, February 25 and 26.

GRANTED that the final solution of the problem—the saving of the *pro rata* contribution of the food industries to the eight billion dollar annual distribution loss—will not be found in the present Louisville Grocery Survey, it still is obvious that work so far done has great value. From some such source will come a method which, when applied to the entire country and actively backed up by the manufacturer, wholesaler, and retailer of food products, will assure a definite solution of the problem, with more nearly complete elimination of the present extravagant distribution waste.

CHANGING tastes and habits of our people have brought about alterations in markets for food products that have not been accurately measured; in some cases not even considered by the manufacturer of food products. It is significant that the results of the present survey will the more surely point the way for the manufacturer to follow in supplying the market for his present or new products, because of the fact that the survey is being made by the agencies that will distribute his product.

THE VITAL IMPORTANCE of the study at Louisville to all manufacturers of foods demands a close and detailed study of its results. Likewise manufacturers are urged to be actively represented in similar surveys that are to be made in other localities under the guidance of the Department of Commerce. The problem of balancing production with consumption, as pointed out by William Butterworth, president of the United States Chamber of Commerce, is squarely in the hands of the business man.

The Smoot-Hawley Bill Now Being Formulated

FROM ALL INDICATIONS now available it would seem likely that tariff revision enacted at the coming session of Congress will be limited to a relatively few items, and those confined rigorously to matters in which the American agriculturist has a real interest.

Reasoning by analogy such, for example, as the indirect competition offered by bananas to American fruits, will in all probability be regarded as beside the point, with the natural result that requests for tariffs on our imported exotics will be consigned to the waste basket.

In all truth it would seem that some of our fellow citizens have forgotten momentarily the importance of maintaining the wide diversity of our present diet. Practically all of our foodstuffs, with the notable exception of maize, were at one time exotics. Even our greatest contribution to the world's food supply—the potato—came from South America. We developed the grapefruit, of which we may be justly proud. With few if any exceptions the native American fruits, vegetables, and cereals, other than those just mentioned, found by early settlers were already known to Europe or the near East.

From the outset our effort has been toward expansion of the food supply, not contraction. It would be a sorry happening, indeed, if the opening days of the administration of our most cosmopolitan of presidents were characterized by the insular point of view exhibited by certain of our growers during the recent tariff hearing. There seems to be little fear of any such dietetic blunder—although it is never safe to rest easy in the assumption that good sense will prevail when interested groups are busied with the great American game of "log rolling." Better let your Congressmen know how you feel about it.

Anti-Sweets Advertising Still Arousing Interest

SHORTLY BEFORE the close of 1928 the National Confectioners' Association filed with the Federal Trade Commission a formal complaint requesting an investigation of the truthfulness of the testimonials alleged to have been made by various celebrities and forming an integral part of certain advertisements of Lucky Strike cigarettes. Public announcement of this action by the candy makers was delayed until the commission had initiated the procedure preliminary to such investigations. Since the date of filing the complaint (December 7, 1928) the investigation has been under way, although no general announcement relative thereto will be made until the work is completed.

Whatever eventuates as a result of this federal inquiry, those responsible for the advertising of Lucky Strike cigarettes are arousing hostility in several quarters. Many critics take the ground assumed by our editorial of last January to the effect that an incidental effect of the American Tobacco Company's campaign may be to injure more or less grievously the good name of general advertising. No less an authority than Mr. Earnest Elmo Calkins, an advertising man with a well-developed objective view of advertising as a whole, claims that the "tie-up" of Captain Fried of the S. S. *America* with Lucky Strike cigarettes, "dealt honest advertising a black eye." Somewhat later *Sales Management,* an advertising and merchandising magazine, proposed that the International Advertising Association set up an "audit bureau of advertising" the function of which shall be to pass upon all advertisements that raise the question of misrepresentation or exaggeration of fact.

It is to be hoped that out of all the turmoil and stress incident to conflicting interests will come results of real validity. Probably no one questions the worth of an honest testimonial honestly arrived at: certainly it is a most potent form of advertising "copy" and has been used successfully from the very inception of advertising.

But what of the value of testimonials based upon such notoriously unreliable instrumentalities as the human sense organs, particularly the sense of taste when functioning alone? Those who are interested might well add to their working library *The New Republic* for Aug. 8, 1928, in which appears "Blindfolded You Know the Difference," by Stuart Chase, being a recital of work done in the psychological department of Reed College, Portland, Oregon, by Louis Goodman, as the thesis requirement for his doctor's degree. According to this highly objective study by some twenty students it would seem that the sense of taste when operating under scientifically controlled conditions is quite unable to differentiate among the several brands of cigarettes now on the market.

For example, in forty-four presentations, Old Gold was named correctly but twice, the blindfolded smokers misnaming it Camel (13 times), Lucky Strike (10 times), Fatima, Chesterfield, Stroller, Three Castles, Tareyton, and One Eleven. One Fatima enthusiast, blindfolded, failed to distinguish his favorite from Strollers—at half the price. Another, claiming that he always knew Tareyton and Piedmont, when blindfolded misnamed, first, a Fatima and, second, a Chesterfield. Another whose favorite was Three Castles, called them Old Gold and then Marlboro, although he was being given cigarettes from the same package of Three Castles all the time. The full report of the survey is a 160-page typewritten document, twenty-seven pages being devoted to methodology. The testing procedure was carefully developed, including blindfolds, frequent rest periods, black unsweetened coffee between presentations—in fact, all possible safeguards and precautions against accidental error. It constitutes a highly interesting commentary on much current advertising matter.

When Is a Registered Trade-mark Yours?

IF YOU ARE a private label jobber, of if you are a manufacturer catering to private label trade, you will be vitally interested in the case of U. S. Printing & Lithographing Company vs. Griggs, Cooper & Co., St. Paul wholesale grocers, that will shortly be reviewed by the U. S. Supreme Court. "Home Brand," a registered trade mark of Griggs, Cooper & Co., has been exploited by them for over 30 years in Minnesota, Wisconsin, Iowa, North Dakota, South Dakota, Montana and Washington. Approximately three dozen trade-mark registrations have been made of this brand covering their several products during this period of time.

Recently it developed that near-duplicates and imita-

tions of their brands have been used by other merchants in Kansas, Illinois, Indiana, Pennsylvania, Missouri, Ohio, Michigan, Maryland, Virginia and Louisiana involving such names as Home Run, Home Pride, Home Town, Harvest Home, Home Comfort, Home Club, Home Grown and Home Pack.

Oddly enough the wide distribution of the variants of the Griggs, Cooper Home Brand seems to have been brought about by the activities of the U. S. Printing and Lithographing Company, Cincinnati label manufacturers, who are alleged to have either designed or printed all of them. Suits for injunction against the U. S. company have been decided favorably by the courts of Ohio including the Ohio Supreme Court. It now has reached the U. S. Supreme Court on appeal of the defendant.

To users of private brands the impending decision will have far-reaching effects. The contention of the defendant is to the effect that to be valid a trade-mark must be used, and also that the equity in a trade-mark follows the trade and never precedes it. In the first three rounds of the fight the score is 3-0 in favor of Griggs, Cooper & Co. Those who care to indulge in guessing which way the cat will jump will find an interesting bit of reading on page 142 of December *Food Industries* under the title "Two Corporations Entitled to Use 'Del Monte' Trade Name" in which it was reported that the Patent Office had ruled that due to long acquiescence the firms have lost their rights to interfere with each other. That, however, was a Patent Office decision and not a Supreme Court ruling.

Plan to Attend the Chemical Industries Show

INDUSTRIAL PROGRESS follows very closely the speed, vehicle and scope of broadcasting of ideas. It can safely be said that to the present time industrial development of this country has increased in direct proportion to the development of our several means of disseminating information. Of equal importance is the capacity of the recipient not only to receive but also to digest mentally and apply the information received either through the printed, written or spoken word or through seeing the thought demonstrated in practical fashion.

A new material is developed; an old and well-known product is produced in a new form, more efficiently and consequently at a lower cost; a new alloy is produced; a new and revolutionary type of equipment is designed, built and put into operation. All these achievements together with the results obtained are widely distributed through the printed, written or spoken word. The result is not only reflected in the fields or industries chiefly concerned but these same thoughts are picked up and applied to other and in many cases dissimilar industries. A breakfast food manufacturer develops a new product through the application of high-steam pressures slowly built up and suddenly released. The idea started a train of thought in the minds of men interested in another field. Similar steps were applied in the treatment of wood, the result being a new and valuable building material. Those who supply equipment and materials have found their business completely changed through such developments. Whole industries have been placed in serious jeopardy through policies that shut out or stifled to a marked degree the influx of, or development of such thinking.

The food manufacturer has before him, in the 12th Exposition of Chemical Industries, held in New York City the week of May 6, an excellent opportunity of viewing in one collection methods, equipment, and materials that may change, for the better, his entire production program. They may even suggest, through closer study, ways and means for bringing out newer, better and less expensive products.

Equipment and materials now used in food plants will be exhibited under the direction of men trained to discuss, in terms of achievement, the application of their product. Likewise, there will be on view machines that logically belong in the production line up of progressive food processers.

Mixing, kneading, grinding, screening, handling, evaporating, distilling, separating, drying, cooking, packaging, power developing and transmitting equipment, together with many materials for equipment construction, containers, raw, semi-finished and finished products—all will be among the four hundred exhibits scheduled.

Men interested in production, from not only the process industries but from the food industries as well, will attend. Your president, vice-president, superintendent, department foreman or engineering staff will, in most cases, bring back to you ideas, which, when applied to your particular problems, will more than repay the cost of the trip.

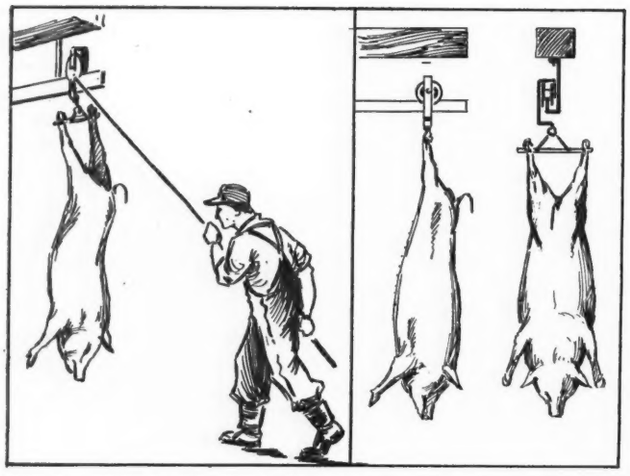
The Economy of Dewatering Foodstuffs or Raw Materials

WATER is an essential element in the growth of animal or vegetable life, but the fresh foodstuffs can usually be deprived of at least its excess of water with advantage and economy. These comments are prompted by press announcements to the effect that paper cartons are beginning to replace glass bottles as containers for the four million quarts of milk consumed daily in New York City. The annual loss resulting from broken, stolen and lost milk bottles—a loss that has been paid by the consumer—aggregates about two and a half million dollars per annum, and a saving is predicted by the use of the substitute carton, a saving which should be passed on to the consumer, in part at least.

Economy in this industry might go still further by reducing the appalling cost of freighting water—the major constituent of milk; but the public must first be educated to appreciate the fact that dried or "condensed" milk can be used for many purposes to which the natural and unprocessed produce is now being put.

The dewatering of vegetables is an industry yet in its infancy in the United States, but it is one that promises substantial returns to those with initiative, business acumen, and an appreciation of the need for precise and efficient processing methods. When the demands for quality and availability have been satisfactorily met, dried vegetables will be acceptable to the housewife because of the relief from the need for frequent purchases, a saving in weight of the product handled, and the avoidance of deterioration or loss by bacterial development during storage. A significant advance will have been made when the average American kitchen contains a supply of dried vegetables of domestic origin at least equal in variety to the customary store of dried fruits, and at least equal in quality and flavor to those being manufactured in Continental Europe.

Meat Packers Set N
HANDLING M



Sketches showing the evolution of the overhead power-driven conveyor; (left) showing method of suspending and moving carcass and (right) the trolley and overhead rail

FIRST in volume of sales, and third largest in capital investment, the meat packing industry is notable for having pioneered in the use of the moving chain for the transfer of products, developing therefrom handling methods now used in every operating phase of the business. Many are of the belief that because the basic materials (hogs, cattle, calves, sheep) never change, receiving in consequence a standard sequence of operations, the matter of their handling should be a simple one. The problem, however, resolves itself into one requiring careful study when the many variable factors attendant upon the processing are considered. Such factors are deterioration, variation in sizes of animals, temperature control, sanitation, isolation of edible and inedible products, together with the many types, sizes, kinds and brands of products and byproducts that are processed and manufactured.

An important factor which leads to diversity is the state or condition of the many materials and products handled, namely, live animals, foodstuffs, lard, oils, greases, pulverized materials, frozen goods, gelatins, hair, wool, bones, hides, canned meats, produce, glue, animal foods and fertilizer.

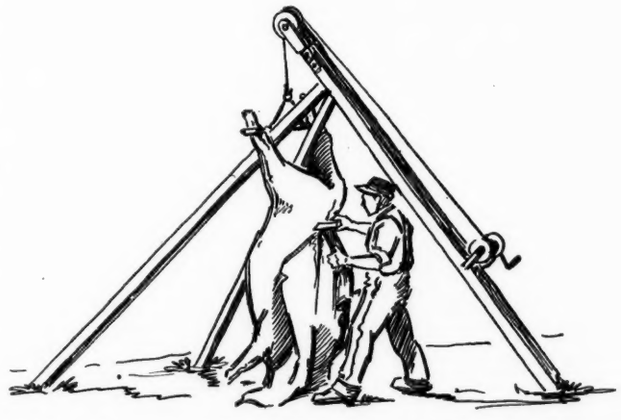
The many types of industries represented by these products are also an important factor, as practically every department differs entirely in nature from the next. Comparing, for example, slaughtering and curing, the margarine factor and the smokehouse, or the sausage department and the lard refinery, it is evident that the operations are similar only in the fact that they process materials having a common origin—live stock. The service departments, which are important also, differ markedly from the producing departments: they include the cooper shop, car shop, laundry, box factory, can factory, and others.

The containers in which these various products are shipped are of many types and sizes, each requiring individual treatment from the point of view of plant transportation. Shipping packages and containers used for packing and transporting the products of the meat packer comprise wood boxes, barrels, tierces, kegs, car loads of bulk product, tank cars of bulk grease, fibre cartons, pails, tubs, bags, cans, steel drums, refrigeration boxes, and many others.

A phase of the business calling for a high degree of flexibility is the inability to plan production definitely, or to control it closely, because of the fact that operation as a whole is controlled directly and primarily by receipts in the live stock market and secondarily by shipments made in response to retailers' orders. These factors cause great fluctuations in volume from day to day, overloaded equipment being at times a consequent necessity.

Owing to the narrow margins of profit and the necessity of large volume, the importantce of economic materials handling in such an industry is a vital problem. Also, because of the operations being simple, short in duration, and numerous, the problem is the most important in the operating sections of the packing industry.

This is visualized by the fact that of the consumer's dollar, the packer receives only 15.5 per cent to cover expenses and profit, of which 4.7 per cent is required for transportation and marketing expense. Then it must be remembered that only one-tenth of the 15.5 per cent revenue is required for operating expense. Such operations as cooking, smoking, curing and chilling require an extended period for processing but do not require labor, as they represent a processing time. There has been a constant aim, therefore, to produce, distribute, and market at a minimum expense. This policy has



Sketch of device used for elevating and suspending carcass for hide removal, viscerating, and dressing. Typical of the early methods, and employed before the slaughter-house period, this makes an interesting contrast with modern methods.

New Standards in MATERIALS

By Walter C. Hasselhorn

Supervising Engineer,
Stevenson, Harrison & Jordan,
Management Engineers,
Chicago

The incline up which the cattle are driven to a height of five stories, providing sufficient elevation for gravitating parts to lower floors for further processing. The lower runway is used for calves and sheep

brought about the development and unique application of many devices.

The history of the industry, especially the evolution and improvement of operation methods, is of particular interest when one considers the early slaughtering procedure and recalls the crude slaughter-house, operating without mechanical refrigeration; the lack of specialized operators or operations; the disregard of sanitary measures, the waste of byproduct materials and the entire absence of materials handling devices.

A most thorough application of the gravity chute type of conveyor may be found in the slaughtering and dressing departments of the modern meat-packing plant. The elevation required is usually obtained in other industries by means of elevators, power-driven hoists, or conveyors. In this respect the packers are rather fortunate in being able to induce their raw materials to elevate themselves. Beef is raised to a height of three to six stories by driving the cattle on the hoof up a gradual incline. The cost of this operation is remarkably low. In one instance, an average weight of 250,000 lb. of live animals an hour is elevated to a height of five stories at a cost of 42½c., or 3.6c. a ton. This elevation provides the necessary height for gravitating the lower floors such parts of the animal as hoofs, hides, blood, heads, viscera and tails to the departments further processing these byproducts. The same principle is applied to the elevation of calves and sheep, but on account of the lesser volume of inedible parts transferred to other departments the height is generally restricted to two or three stories.

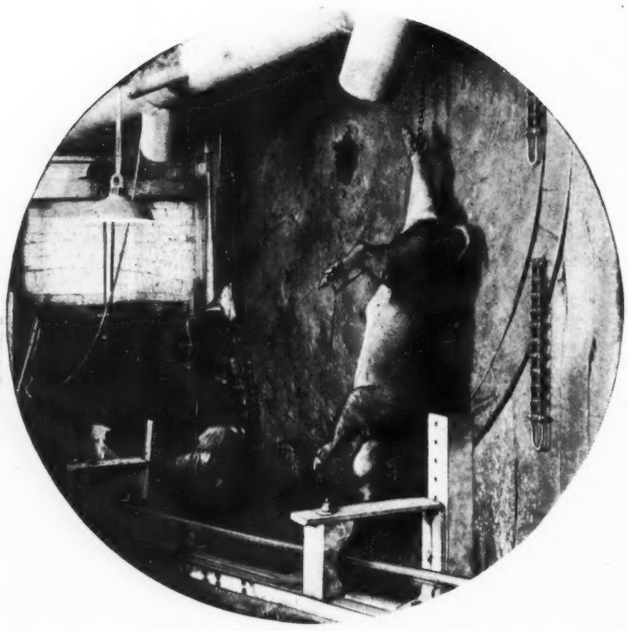
The live stock having been elevated to the slaughtering and dressing departments, the next series of operations includes the dispatching and elevating of the carcass to the overhead trolley rail, in preparation for dressing.

The friction-type, power-driven hoist is employed in elevating the cattle, the wheel type commonly being used for hogs, calves, and sheep. In the former instance, the cattle have been stunned and are lifeless, and in the latter, the live animals are shackled by the hind foot and attached to the wheel. In both instances shackling operations are difficult and hazardous. The value of transferring the animals on an overhead conveyor is appreciable. Imagine antiquated manual methods such as block and tackle, or hand winch, being employed to elevate 140 stunned cattle or 650 live hogs an hour from the floor to a height of 15 feet! The hoist principle, therefore, is important, and it is indispensable when handling such volume. A battery of 60 friction hoists are used in a department designed to kill and dress 150 cattle an hour. These hoists are also employed in the beef dressing operations (hide removal) their purposes being to lower the cattle on to the pritching beds then to raise them to varying positions for hide removal; finally to elevate the carcass on the power-driven overhead conveyor.

Another application of the friction hoist is to be had in the downer hoist—a mechanism which hoists crippled cattle, after stunning, from the yard to the slaughtering floor.

Chutes

Unlike automobile assembly plants, forge shops, and the like, packing houses are built to contain several stories varying from four to eight. The elevating of the live stock being economical, the gravity chute method of transferring product to lower floors is employed extensively, especially in the dressing, cutting, curing, and packing departments. By means of this system, a pork cutting department, for instance, will transfer the hams and shoulders to the sweet pickle curing department; the loins and trimmings to the fresh pork packing department; the bellies, sides, fat backs, ribs, backs, jowls and plates to the dry salt curing department—each product using an individual chute and moving it to its proper destination without further handling or attention. When, however, meats such as bacon bellies, are gravitated from considerable heights, and great velocity is attained, the meat, in striking the sides of the chute, is beaten into a



Wheel type of power-driven hoist in use with hogs on their way to the sticker rail

mass of pulp, and resembles a roll or ball when finally released at the destination. The design of the chute, then, is important as regards pitch and shape.

Departments packing for shipment also employ such devices in gravitating the boxes, barrels and containers to the car loading platforms. Containers varying in size and shape are handled from a height of six stories.

The installation of a shute that eliminated the trucking of boxes and barrels resulted in a yearly saving of $25,-200 in direct labor. Relief in elevator congestion was noticeable in other operations. One man sorting the packages at the spout of the chute is the only labor required.

The construction of these chutes is generally of sheet steel. The design will vary as to the kind of product handled. Where considerable height is necessary the spiral type is generally employed.

Overhead Conveyors

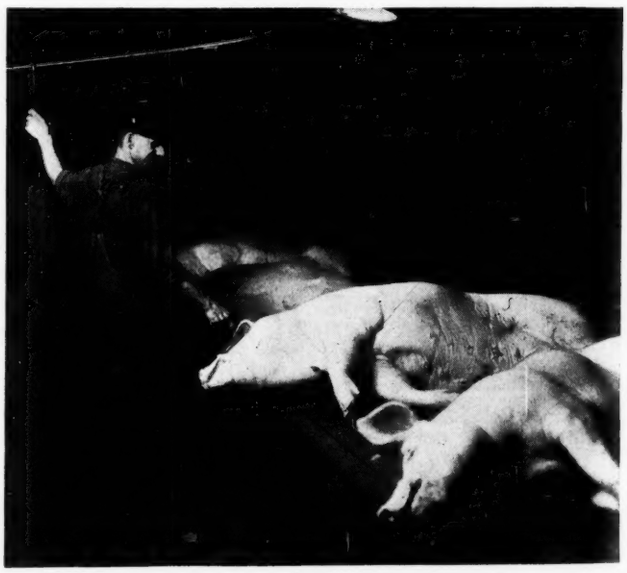
Introduction of highly specialized operators for the dressing of carcasses was made necessary by the scarcity of skilled butchers capable of performing the entire dressing operation and rendered possible by the overhead conveyor. The packers have pioneered into development of this principle. In its early stages, the movement of the carcass from one operation to the next was accomplished by men pushing the carcass with poles along parallel wood rails, the animal being suspended from round wood bars, which also acted as slides.

If this method of moving the product from operation to operation were to displace the modern overhead power-driven conveyor chain, and the present schedule of 500 hogs an hour were to be maintained, a force of 192 men would be required to move the hogs at a necessary rate of 25 feet a minute. The explanation is that it requires 23 min. for one hog to travel from the dispatching operation to the chill rooms when dressing 500 hogs an hour. As one man is required to push one hog, the 23-min. trip time would permit 2.61 trips an hour, permitting no time for recuperation, however. Dividing the rate of kill by the number of trips determines a result of 192; namely, the force required, or an expense of $86.40 an hour. The present power cost for the conveyor chain operation is 86/100 of a cent an hour. Maintenance is likewise inexpensive. Although the work stations on the conveyor chain cited in this example are closely grouped, and no floor space is wasted, a total of only 7.25 standard minutes of actual operation time is necessary to complete one hog, or 31.5 per cent of the total time of travel.

Some packers have improved the overhead system by providing the chains with an indexing feature, which starts and stops the conveyor, so as to allow the operators to complete their particular operation before moving the carcass to the next operator. This principle is especially valuable in the hog-cutting department, where the carcasses are converted into standard parts such as hams, bacon and shoulders. Accuracy and skill are essential to these operations. The work is performed on conveyorized moving tables of the endless moving belt type.

When the volume required is in excess of the amount that can be handled economically by one power-driven overhead chain system, and when increasing the capacity of that chain would be impractical owing to the length of time the carcass would require to travel the distance to the chill rooms, double killing and dressing units are installed. Market conditions cause overloads of equipment, and in order that the maximum production may be handled at a time when hog prices are favorable, much of this excess capacity is necessary. In many of the large hog killing and dressing abattoirs throughout the country, therefore, one finds double units capable of killing and dressing 1,400 hogs an hour, sometimes operating at maximum. When live stock markets are unfavorable, the kill will fall off to 700 hogs an hour and even less.

The removal of hides and preparation of beef for eviscerating is performed by most packers on the floor or



Hogs coming from the dehairing machine to gambrelling table on an endless belt slat conveyor

pritching beds. Where the conveyor principle is not applied, and the operators walk from animal to animal, considerable time is dissipated. In a slaughtering department killing 150 cattle an hour, the operators spend

two hours of an 8-hour day moving from carcass to carcass. In several instances, moving floors of the escalator type are used. Their practicability, however, is doubtful, and their adoption slow.

The value of the conveyor principle, then, is appreciated, especially when applied to a product having a standard sequence of operations, performed by specialized operators, and moving over a permanent, well-defined route.

The use of the power-driven chain terminates when the carcass is delivered to the chill rooms. Here the carcass is graded, and, depending upon its class, it is switched out into the proper cooler box upon a hand-operated tram rail.

This type of overhead conveyor system is used somewhat extensively in the coolers, loading dock, beef cutting department, smoke house, and sausage department. The trolley principle is employed, and manual labor, gravity, or electric tractor are the means of propelling the carcasses, sausage cages, or ham trees.

In the loading docks, or where carcasses are being moved over any considerable distance, as to the cutting rooms, the electric tractor provides an ingenious means of locomotion.

Gravity is also employed, and carcasses are transported economically over long distances to other buildings at considerable speed.

The smoke house uses the overhead rail system entirely in moving its products from the washing operation through the smoke houses into the holding rooms and to the packing rooms, the product remaining untouched on the ham trees during the entire process.

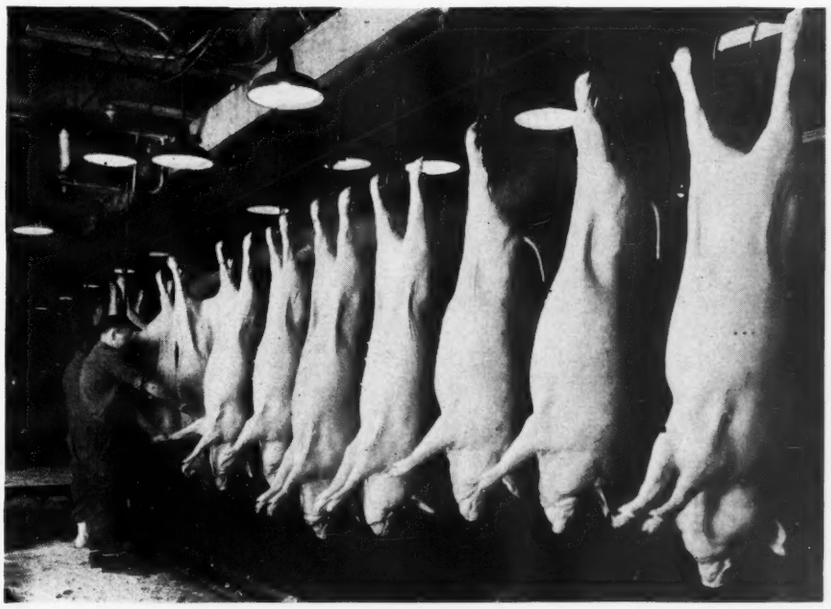
The extent of such a system can be readily visualized by the following data. A smoked meats department handling an average volume of 95,000 lb. daily requires a trackage of 3,034 feet. Elevators equipped with matched rails connect the five floors over which this system extends. Pole- and rope-operated switches connect the various tracks, making the network of rails a flexible means of materials handling and storing.

Floor space economy effected is noteworthy. It would require 858 trucks (each equipped with hanging racks) of a capacity 1,500 lb. to replace the overhead system. The congestion would require more than double the present layout to permit operations of equal volume.

Sausage departments are similarly equipped. After stuffing and linking, the sausage is hung on wood sticks, which are suspended in overhead cages. The sausage is not handled again during the remainder of the processes, which comprise chilling, cooking, smoking, weighing, and rechilling in the packing department.

Maintenance of this system is a negligible factor, as the rails only require occasional painting, the switches periodic cleaning and oiling, and the trolleys regular oiling.

Ham and bacon "trees," used to avoid re-handling, are suspended by trolleys from overhead rails



Overhead power-driven conveyor moving hogs past the men who shave off the last few hairs

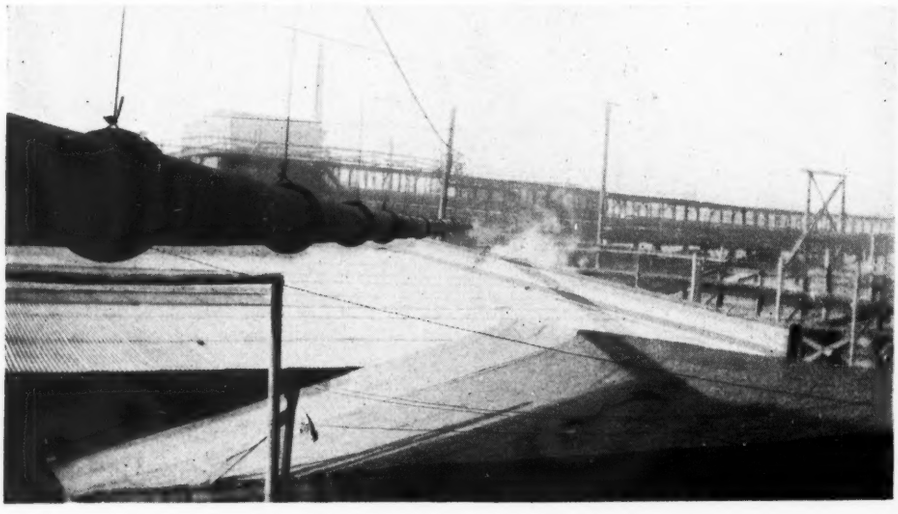
Equipment that comes in contact with meat, however, requires thorough sterilization and washing after each use. This sanitary measure affects carcass trolleys, ham trees, sausage cages and so on. Moving parts require more frequent lubrication.

The principal advantages to be credited to this overhead conveyor system are saving of floor space in processing, economical maintenance, flexibility, and ease of handling.

Gravity Rolls

When food products such as smoked meats, sausage, lard, oleomargarine, and canned meats, having been wrapped or cartoned, are prepared for shipment, they are packed in boxes, containers or barrels in accordance with the customer's orders. It is a common practice to equip these packing units with gravity roller conveyors to facilitate easy movement of packages along the line of operations to the destination, which may be either a tractor trailer, gravity chute, or freight car. The use of the roller type is an improvement over the sheet metal top packing bench, which made it necessary to have operators at regular intervals in order to push the package

to the next operation. By applying a slight grade to the roller packing conveyor, the package moves easily to the next position, a feature which permits ease of operation and reduces fatigue. By this method the benches and packing operations can be extended over greater distances, creating more flexibility and reducing the amount of handling in delivering the finished package to its destination in the department. The ball-bearing, steel-roller type is found to be the most popular, and the maintenance factor is practically nil. Specialization of tasks is an important factor, each man having a definite operation to perform on each package. Here is an example: one man load scale; one man scale and pack in box; one man scale tare of package and mark; two men nail cover and wire bind; one man stencil destination product; one man check, scale and check order; one man stencil weights and push down chute. This is a typical line-up of a packing bench. The weight packed hourly averages approximately 12,000 lb. Other uses of this equipment are found in moving products from the departments to the loading points, whenever definite routes are established and sufficient volume is maintained.



Pipe lines through which pulverized materials are blown considerable distances at a rate of three tons per hour

Tractor Trailers

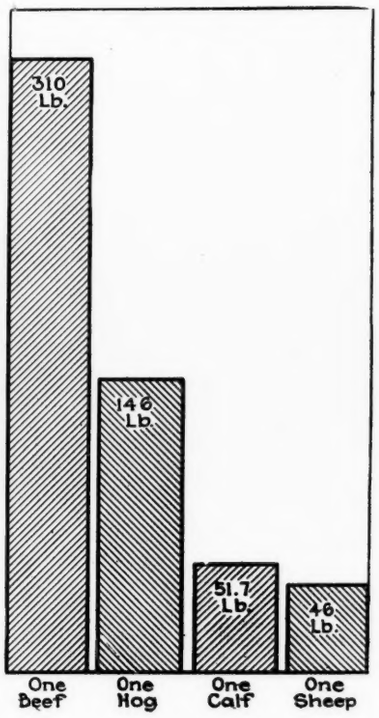
Interdepartmental transfer of products not handled by conveyors is made by hand trucks and tractor-trailers. The latter, however, are limited to use on the same level or on levels connected by ramps and runways. The special adaptability of this system is to use on loading docks, or to the transfer of products from the many shipping rooms throughout the plant to the refrigerator cars. In this manner considerable volume is handled easily and economically, one tractor drawing as many as eight loaded trucks to the destination. As the product, being perishable, must be handled in as short a time as possible, especially in the summer months, regular schedules for pick-ups are maintained.

By one organization the problem of negotiating various levels has been solved satisfactorily by the equipment of its plants with special elevators that will accommodate an entire tractor train at one time, the length of the elevator being approximately 45 feet. Another plant has double-decked streets, permitting interconnection of buildings without street traffic interference.

The tractor also provides considerable utility in the hauling of machinery, pushing beef on trolleys, and other purposes requiring powerful traction. A plant loading an average of 65 cars a day employs ten storage-battery tractors, several of which are required for night operations. For small quantity shipments and car-route orders, this system does not offer sufficient flexibility, and the hand railroad truck is employed. The storage-battery type is the most popular style of tractor. Roller bearing trailers of various types are used for hauling the many kinds of packages.

Hand Trucks

Electric lift trucks and skids have not yet found any considerable place in this industry; however, their use in connection with the loading of hides, cured meats, tierced products, and picking up small quantities in the shipping departments for refrigerator cars is recommended.



Steam generation visualized in the number of pounds of coal required by a packer to convert one animal to food and byproducts

A combination of the skid, trailer, and lift truck has been developed recently by a packing-house employee, and its utility in loading cars and moving packaged product is remarkable. This caster-equipped truck can be used as a hand truck or trailer, and especially as a lift truck skid, it making a flexible means of product handling.

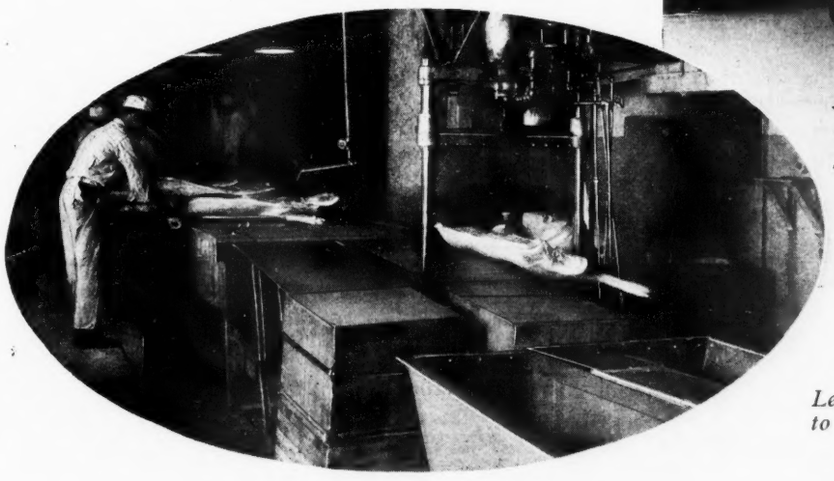
Gasoline tractors are finding a place in the industry, particularly in yard work, and in the transferring of offal and byproducts to and from buildings and over considerable distances.

The transportation of products in this industry is not confined entirely to mechanical devices, and for the move of miscellaneous products over irregular routes where mechanical conveyance is impracticable many types of hand trucks are employed. Standardization of these styles is now in progress, simplification having already resulted from the standardization research program of the Institute of American Meat Packers.

Hand trucks are being used most extensively in the transfer of cured meats, disposal of fats to tanks, and the handling of various byproducts. The extent of their use, however, is gradually diminishing, as the trucking labor involved is a factor of considerable expense, the elimination of which is still being sought. The list of hand trucks used in the industry includes box trucks, rack trucks, pan trucks, dump trucks, condemnation trucks, flat trucks, head trucks, railroad trucks, barrel trucks, tank trucks, viscera trucks, meat trucks, liver trucks, bacon trucks, sausage trucks, seeding trucks, curing box trucks, and many others, each of which has its special purpose and advantages. Roller-bearing equipment is only employed in special instances, but it is gradually being adopted.

Endless Belts

Lack of incentive standards and an easy means of moving product created the need for a mechanical monitor for regulating production and thus for a materials handling device. The endless belt type conveyor fulfills both of these requirements, and its use is found to be quite extensive in the industry. This principle is applied to viscera tables, dry salt overhauling tables, grading benches, sliced meat packing, canning operations, outside dressing of hogs, and other operations where a constant or regulated flow of product is desired.



Above. Electric tractor and trailers moving product over the tramway

Left. Roller gravity conveyor used to feed mechanically operated knife of the guillotine type

Many kinds of belts are used as conditions warrant, canvas, leather, steel-plate links, wood links, and linked pans making up the list of belt types. This type of conveyor is used in cases where the product requires careful handling, or where the parts require isolation to prevent contagion. In cases where viscera are moved, an ingenious means of sterilizing the belt is employed, so that in case the belt comes in contact with any condemned parts of animals, the conveyor will receive the parts following in a perfectly sterile condition. This is accomplished by means of a housing containing live steam through which the belt passes. Rinsing with hot water takes place upon each complete revolution.

In materials handling problems the factor of sterilization is often encountered. Care of motors, driving gear and conveyor belt parts comprise the expense items of maintenance. These, together with the electric power consumption, make up a comparatively low operating cost.

A large part of the packer's volume is represented in animal fats, such as oleo oils, greases, and lard. In this branch of the operating section an economical method of materials handling is again presented. Here the pipe-line method is utilized extensively. The movement of liquids is accomplished by means of gravity or pumps, the many-storied buildings providing the elevation necessary for gravitating the liquids from operation to operation on the floors below.

Departments processing oils and lards are laid out to accommodate the gravity principle. The first operation is located on the top floor and those following on lower floors in sequence. Take, for example, the oleomargarine factory. The various oils are emptied from barrels or containers into respective melting and mixing vats installed on the top floor of the building. On the floor below are the milk-treating machines, and on the next floor the churns and crystal vats. The product handled by this equipment is in a liquid state and the milk and various oils are gravitated through pipe lines. Temperature control is an important factor in transporting the edible oils, and insulation and flow rate must be observed carefully.

When negotiating distance or height, and in moving heavier oils or greases, steam pumps of the force type are required. Steam and maintenance are the direct expense factors created by this method.

Drag Lines

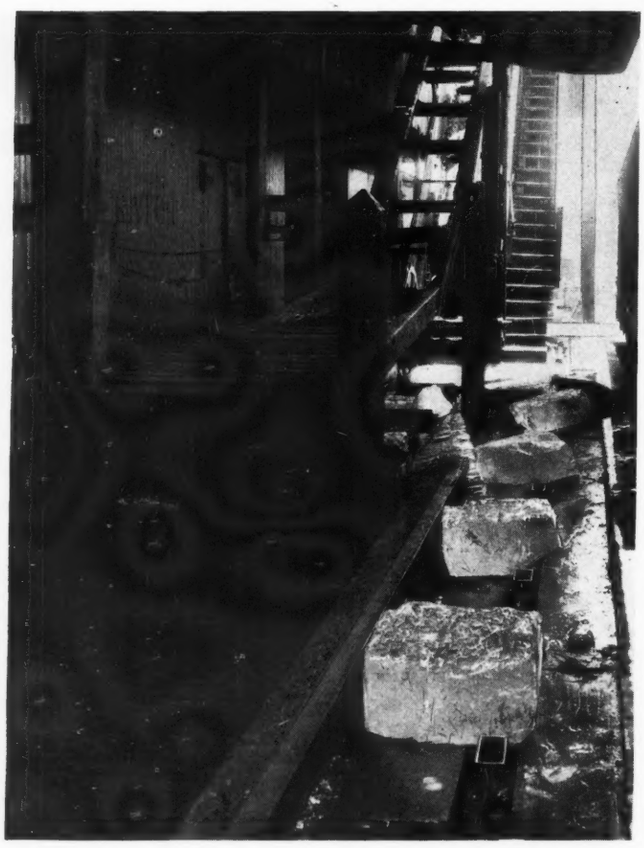
To materials such as ice, pulverized matter, packages, and any production that slides easily and does not require extremely careful handling, the endless drag type easily applies itself. This style of materials handling equipment is of several types of construction. The endless cable, with lock disks evenly spaced, is used in handling powder or pulverized products, especially fertilizers and animal foods. The drag line moves in a "U"-shaped trough in which the material is fed and carried along by the disks. Feeding mills, grinders, and mixers are characteristic applications of this device.

Packages, ice, and similar objects are handled by drags having parallel endless link chains driven by sprockets, connected by steel or wood members at regular intervals of, generally, four or six feet. These travel on a wood or steel bed on which the package slides. The speed of travel of the belt and drag conveyors ranges from 20 to 60 feet a minute, depending on the nature of the operation and the products handled.

Pneumatic

The pneumatic principle of conveying powdered or pulverized materials is finding considerable possibility of application in the byproducts operating section. Cattle hoofs, salt, sawdust, animal foods, dried tankage and similar materials are easily moved over considerable heights and distances. Several firms manufacturing this equipment are selling portable nozzles, which provide an economical means of unloading freight cars. The problem of locating and erecting storage tanks or bins, however, is more or less difficult in cases where old buildings, the location of dock, and the destination of material are to be considered.

An interesting application of the blower system is illustrated. The products handled include rendered crackling, which is transferred to a building in another section of the plant over a distance of 540 feet. The former method of transferring this material was as follows: (a) load into hand truck, scale and dump into freight car; (b) close cars, switch, and move to destination; (c) open car door, load into truck, and transport to portable piling conveyor; (d) feed portable conveyor, and pile in storage bins.



Drag conveyors move materials from building to building economically

The new method requires only one operator, who feeds the blower. The product is transferred at a rate of 6,000 lb. an hour. Another advantage this method contains is that the product is pulverized by striking the walls of the pipes in the process of being transferred, thus performing a necessary operation and relieving the load on the feed mill. The adoption of the method has created a yearly saving in unit cost of $8,400. Maintenance cost consists of electric power for driving the fan, lubrication and maintenance, and the periodic inspection and painting of pipe lines.

Pneumatic hoists have also found their place, in the manufacture of artificial ice. This is a continuous process, air, and the drag conveyor are readily applied.

Air hoists are employed in pulling the cans containing the ice cakes from the brine beds. By means of an overhead crane mounting, the cans are removed to the shrink tanks, where the hoist is again employed in lowering the ice into the hot water and raising for dumping into the crusher chute. The efficiency of this unit is high, and rapid handling of the ice is possible.

Variations in temperature as well as in market conditions have a considerable effect on packing-house operations. In refrigeration this is especially true; to avoid overload of refrigeration equipment it is sometimes necessary to purchase ice.

In one instance a drag conveyor having a dual purpose is thus employed: It hoists the ice to the seventh floor of the building, from whence it is skidded to the crusher and gravitated to the cars; it also elevates boxes for neighboring departments.

Composite Units

Distribution of the crushed ice to the refrigerator cars is highly conveyorized. Gravity chutes transport the ice to a narrow gage electric railway loading point. This storage-battery unit hauls the crushed ice in self-dumping buckets to the car ice bunkers, located adjacent to and below the tracks. Formerly, this operation was performed by men pushing buckets suspended by trolleys from overhead trainrails. The new method requires only one driver and one man for the loading and unloading of narrow-gage cars. The old method is still being used by some plants, and the electric lift truck system is also employed extensively. The latter has considerable flexibility, and speed of operation is possible.

Economical methods are required in the power house of the meat packing plant no less than in the operating departments. In the production of electric power, refrigeration, steam, and the supply of water, strict observance of efficient methods is essential. Here again we find modern methods of handling coal and ashes.

Self-propelled cranes are used for miscellaneous purposes, such as the storing and handling of coal in the yards. Electric hoists elevate fuel to the boiler-house bunkers and, in the absence of bucket conveyors, are used extensively in the handling of ashes. Overloads of equipment, especially the ice machine in the summer months, are common, and provision for peak loads is more throughout.

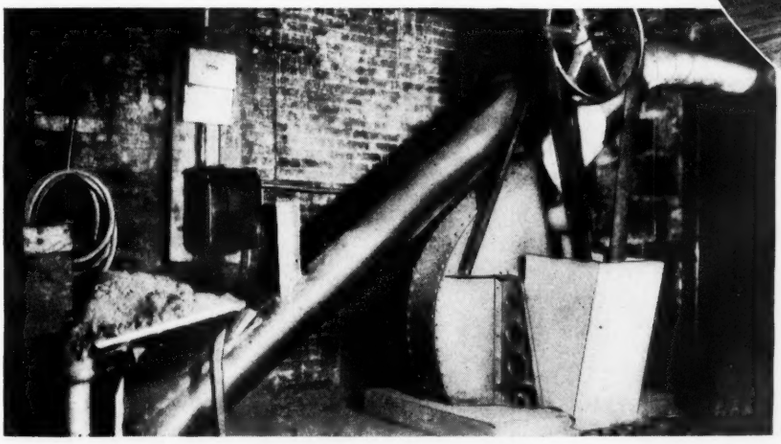
This industry is an example of the effect of close competition upon the efficiency of the operating section of a business.

Evolution from antiquated and inefficient methods has been gradual and constant, so that today we find a complete conversion from the "lines of least resistance" that generally distinguish non-competitive manufactur-

ing establishments. This evolution has come about in stages beginning with mechanization, sanitation, specialization, increased volume, byproducts utilization, efficient materials handling, extensive marketing and distribution system, improved processing methods, and now a gradual adoption of scientific management principles.

Industrial, biological, sales and standardization research departments are active in the large organizations. Doubtless these investigations will produce improvements in all branches of the industry.

One of the important problems is the resistance of of corrosion, electrolysis, and oxidation of metallic equipment. This applies especially to the materials handling equipment. Steam, water, extremes of temperature, acids, salt brine solutions and air all play an active part in the destruction of packing-house machinery.



Pipe lines convey products to many parts of the plant for further processing or filling

Left. Blower fan for sending material through pipe line. One man performs the entire operation of material transfer.

The purpose of this discussion of the present status of production the cost of which is kept relatively low by mechanical means in one of the leading food industries is that of serving as a means of comparison with the corresponding activities in more highly specialized mechanical and technical industries.

In view of the variables encountered and other troublesome factors that must be considered before the adoption of new methods or devices, in many cases involving a radical departure from well-established practice, it seems clear that the meat packer deserves credit for the progress already made in that phase of his operations having to do with the handling of materials.

One may safely predict the early development of methods and devices that will bring about further reductions in cost, yielding to the consumer meat food products of unrivaled quality at prices as low as the circumstances warrant.

Philippines May Bar Chinese Canned Foods

IMPORTATION of Chinese canned fruits and vegetables into the Philippines will be barred unless local importers of these products comply strictly with the recent administrative decision of the board of food inspection regarding the non-admission of defective foods in the Islands, according to a memorandum order issued recently by the Philippine Health Service and forwarded to the Department of Commerce by Assistant Trade Commissioner H. V. Rohrer at Manila.

Heavy penalty has been recommended by the director of health against violators of this order. It is announced that no shipment of canned fruits and vegetables will be recommended for admission in the Philippines without the permission of responsible officials authorized to examine the goods imported.

This drastic measure has been taken owing to the results of the analysis made by the bureau of science which reveals that most of the canned products seized from the Chinese stores are defective and dangerous to the health of the people of the city and the provinces, as a result, it is believed, of inadequate sterilization. Approximately 50 violators of the pure foods law are arrested every two weeks, according to local records.

Australian Sugar Output—1928

It is estimated by the Register General of Queensland, Australia, that the 1928 production of sugar amounted to 515,134 tons at 94 net titre, an increase of 29,389 tons over the 1927 and 29,549 above the 1925 outputs. The estimate of cane cut for crushing was 225,371 acres, compared with 209,636 acres in 1927 and 3,732,328 tons of cane crushed in 1928, against 3,555,827 during the previous year. The yield per acre was estimated at 16.56 tons of cane or 2.25 tons of sugar at 94 net titre, which are slightly below the 1927 figures. About 7.25 tons of cane on the average were necessary to produce one ton of sugar.

Scientific Research

affords means of measuring

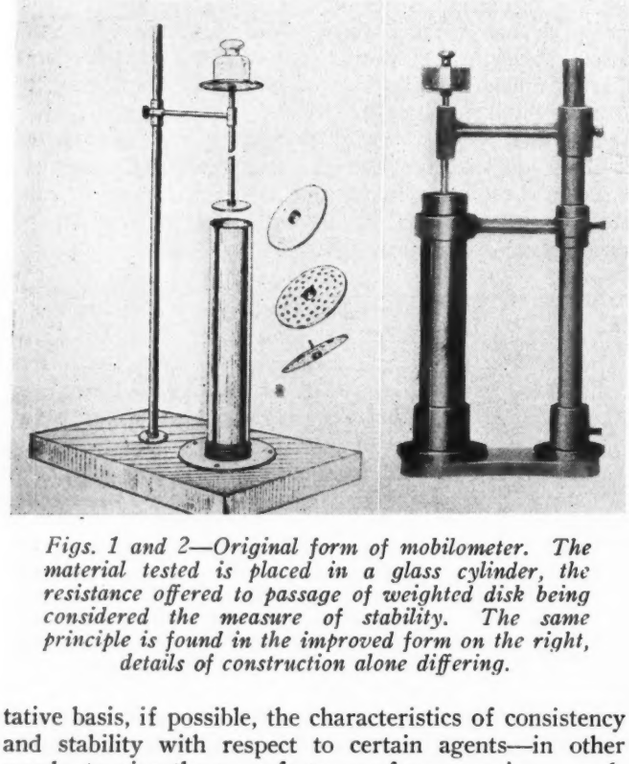
Stability of Mayonnaise

By D. M. Gray and C. A. Southwick, Jr.
Hazel-Atlas Glass Company

MANUFACTURERS of mayonnaise are interested in securing what is considered the best consistency, and in maintaining that consistency until their product is consumed. What constitutes desirable consistency varies somewhat with individual manufacturers, but there are limits of consistency below which and above which it is generally considered undesirable to go.

On the other hand, each manufacturer is anxious to turn out a product with the greatest stability possible. Stability is understood to mean resistance to demulsification, breakdown, coalescence of oil particles, separation, and the like, irrespective of whether this demulsification is brought about by such agencies as heat, freezing, handling, or transportation.

It is the purpose of this paper to place on a quantitative basis, if possible, the characteristics of consistency and stability with respect to certain agents—in other words, to give the manufacturer of mayonnoise a yardstick with which to measure the consistency of his product and at the same time find out something about its stability. In this paper stability was studied in a manner believed to be analogous to the conditions which mayonnaise would encounter during handling and transportation, and at elevated temperatures. Stability as affected by freezing must be studied along somewhat different lines.



Figs. 1 and 2—Original form of mobilometer. The material tested is placed in a glass cylinder, the resistance offered to passage of weighted disk being considered the measure of stability. The same principle is found in the improved form on the right, details of construction alone differing.

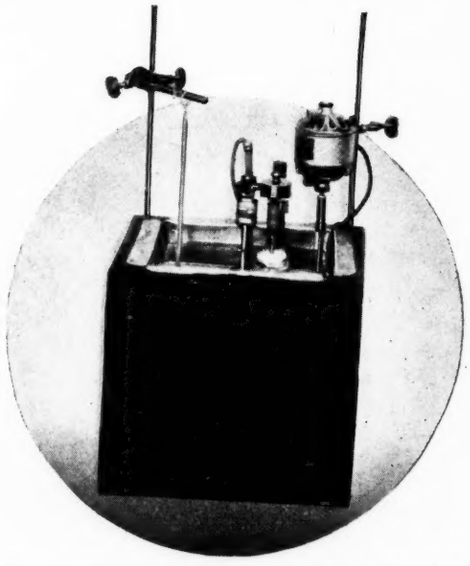


Fig. 3—Thermostat, well insulated, heated by an electric immersion heater, cooled (when necessary) by the addition of ice, agitated by small electric stirrer shown at the right of the illustration.

The possibility of determining the viscosity or consistency of mayonnaise by means of an instrument called the mobilometer has been mentioned by Gardner and Van Heuckeroth.[1] This instrument, designed for the determination of the body, viscosity, consistency, or whatever it may be termed, of opaque, semi-fluid products, has been used in connection with paints, enamels, lacquers, and heavy oils.

The form of mobilometer described by Gardner and Van Heuckeroth is shown in Fig. 1. It consists of a brass tube into which fits a plunger (either perforated or solid) attached to a rod, on the other end of which is a platform upon which weights may be placed. In operation, the tube is filled with the material to be tested, the plunger being started at a given mark inside the tube. The weight is placed on the platform and the plunger allowed to fall. The time required for the plunger to travel from the mark in the tube to the bottom is noted. It is termed the measure of viscosity or consistency.

Prior to this investigation, an instrument was built similar to the one described and some preliminary work

[1] Indust. and Eng. Chemistry, No. 6 (1927), Vol. 19, p. 724.

was done with mayonnaise. Several minor difficulties were encountered, and a slightly improved form, of a more substantial character, was built. This improved instrument is shown in Fig. 2, the essential points of difference between it and the first instrument being: (1) improved construction throughout; (2) longer bearing surface for plunger rod, minimizing side play; (3) greater clearance between piston and tube wall, reducing friction; (4) close-fitting socket for the brass tube, thereby eliminating threads on the bottom of the tube and securing better alignment; (5) close-fitting ring near the top of the tube, also improving alignment; (6) plunger rod bearing bracket aligned on support post by means of countersunk setscrew, to the end that the bearing, and consequently the plunger, will always be in the same position relative to the tube; (7) marks on the plunger rod are used to determine the time of fall of plunger, rather than the click heard when the plunger strikes the bottom of the tube.

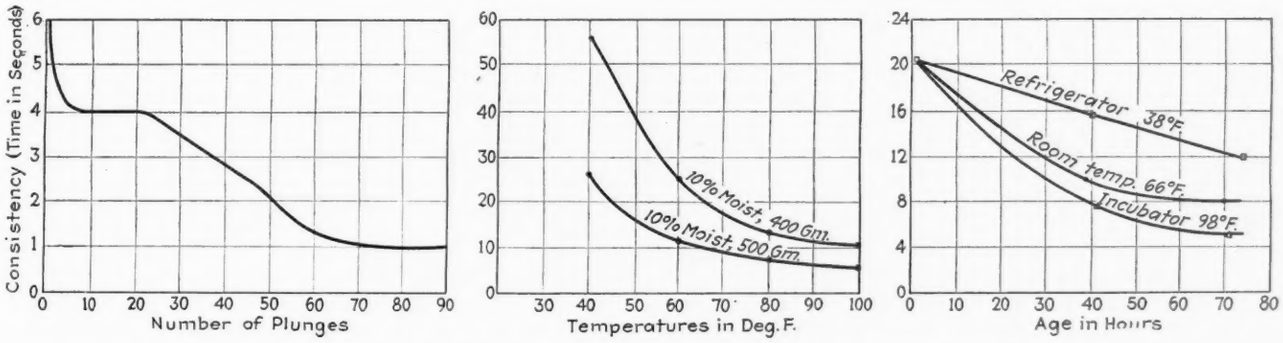
The significant dimensions of the instrument are as follows: mean inside diameter of tube, 1.44 in.; diameter of piston, 1.38 in.; clearance between piston and tube wall, 0.03 in.; number of holes in piston, 46; size of holes in piston, 0.059 in.; distance between reference marks on plunger rod, 18 cm., or 7.09 in.; diameter of plunger rod, 0.248 in.; weight of plunger complete (piston, rod, and platform), 100 grams.

In this investigation the consistency was found to be linked up closely with temperature, making it necessary to control the temperature at which the determinations were made. The small improvised thermostat shown in Fig. 3 consisted essentially of a square 5-gal. oil can, cut down as shown, and placed in a wooden box, the intervening space being filled with cork for insulation purposes. Heating of the bath was effected with an inexpensive electric immersion heater. When cooling was necessary a few cubes of ice were added. The bath was agitated with a small electric stirrer. The mobilometer was placed in the bath, the water nearly to the level of the mayonnaise in the tube, and was allowed to stand at constant temperature for at least 30 min., so that the mayonnaise to be tested might reach the same temperature as the bath. This improvised piece of equipment worked satisfactorily, and it was interesting to note the constancy of the temperature maintained therein, despite the absence of automatic temperature-regulating devices.

The basic formula used in this investigation is fairly representative of commercial mayonnaise, calling for the following percentages: oil, 78; moisture, 10; fresh egg yolk, 8; spices, acid, salt, 4.

Batches were made with different moisture contents, the same ratio of the other ingredients being maintained. The moisture content stated comprises water added as such and the water of the vinegar: it does not include the moisture present in the raw materials. It is, of course, well known that a material such as egg yolk contains varying amounts of moisture. Possible variation from this source was precluded in this set of experiments by using the same batch of well-mixed egg yolk. The same precaution was taken with the other raw materials.

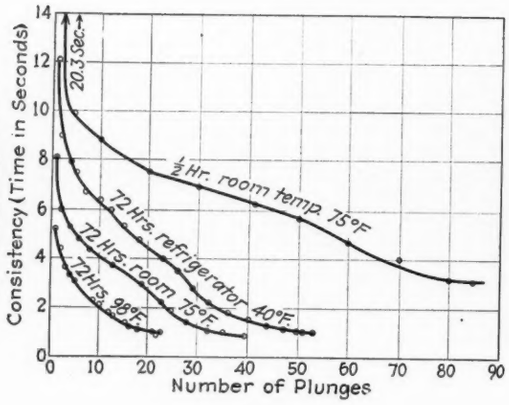
Although consistency and stability were studied jointly in this investigation, it is convenient to discuss them separately. As mentioned above, the term consistency as applied to mayonnaise is often employed synonymously with viscosity, body, fluidity, mobility, stiffness, and other factors, and when used in this paper will be so considered. It is a rather indefinite term at best, and for this reason a standard means of expressing it in mathematical terms will be of considerable assistance.



Figs. 4, 5 and 6—Graphs representative of (a) consistency curve of typical mayonnaise under normal conditions; (b) the important part played by temperature in determination of consistency; (c) influence of age of emulsion at time of test.

Attention is called to Fig. 4, which represents a typical consistency curve. *The consistency is given as the number of seconds required for the plunger to fall through the mayonnaise the distance between the two marks on the plunger rod.* It should be noted that the consistency must be taken as the *first plunge,* as it decreases rapidly with each successive plunge. The total weight used in this case was 500 grams—that is, a 400-gram weight on the platform plus the 100 grams which the complete plunger weighs. Although the moisture content of the emulsion is given as 10 per cent, it is not to be inferred that with this same ratio of moisture, egg yolk, and oil the initial consistency of a mayonnaise emulsion will always be 6 sec. at 60 deg. F. with 500 grams. This figure is subject to wide variation, owing to factors which will be enumerated later.

The values for consistency obtainable with different total weights used on the plunger were determined by experimentation. The set of curves recording this work show that the value for consistency increases at a rapid rate for total weights below 300 grams; also that the value decreases at a relatively slow rate with weights above 500 grams. In other words, the change in the slope of the curves is greatest for weights between 400 and 500 grams. In the major part of this work, a 500-gram weight was used. From this same figure it is interesting to note that, although the consistency with each given weight drops with each successive plunge, the curves have the same general form. Another point to consider is that with weights below 300 grams frictional



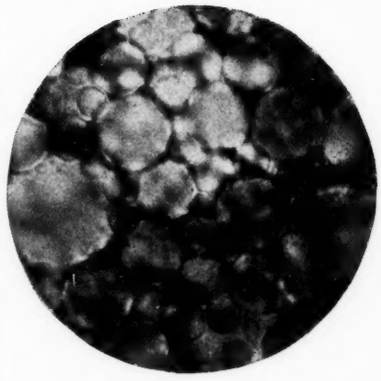
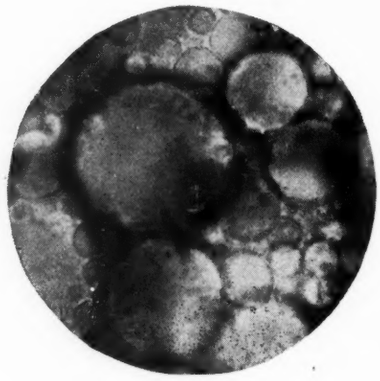


Fig. 7—(graph) Original emulsion ½ hr. old and three samples of the same emulsion held for a fixed period at three different degrees of temperature. The plunges required were 82, 50, 35, and 21, respectively.



Figs. 8, 9 (above) and 10—Photomicrographs indicative of alteration in size of globules after storage of the emulsion for 72 hours at temperatures of 40, 75, and 98 deg., respectively.

forces of the instrument begin to make themselves felt and introduce errors, which detract from the accuracy of the determinations; also that with weights above 500 grams the time interval to be measured becomes so short that it is difficult to determine without a considerable error in observation.

The temperature at which determination of consistency is made is an important factor. This is illustrated in Fig. 5. The greatest change of slope of the curve is seen to be at about 60 deg. F. in the case of the 500-gram weight: this temperature, therefore, was selected for most of the determinations in the investigation. The consistency is seen to increase rapidly as the temperature falls to 40 deg. F. and to decrease as the temperature is raised to 100 deg. F. Other experiments showed the same relationship for an emulsion containing 12 per cent moisture.

Consistency has been found to change with the age of the emulsion. The temperature at which this aging is carried out exerts a decided influence. Fig. 6 shows how the consistency of the emulsion was affected by aging for various periods of time. After a total period of 72 hours the consistency approaches a constant value. The effect on the consistency of the temperature at which aging is carried out was determined experimentally. It is demonstrable that relatively high temperatures reduce the consistency much more than lower temperatures—those near 40 deg. F. It should be noted that in all these determinations the samples were tested at 60 deg. F. This was accomplished by withdrawing them from the three bulk samples being held at 38 deg. F., 75 deg. F., and 98 deg. F., respectively, and allowing them to come to a temperature of 60 deg. F. in the bath before testing.

Variation in the moisture content, the ratio of egg yolk to oil, the rate at which oil is added, the temperature at which the emulsion is made, the type of machine used, the size of the batch, and other factors—all influence the consistency (and the stability, as well), but a complete consideration of their relative effects is beyond the scope of this discussion.

The relationship of size of oil particles to consistency is of interest. Two brands of mayonnaise purchased on the open market were examined microscopically and by the mobilometer. The coarse-particled emulsion had a consistency of 2 sec. and the fine-particled emulsion one of 20 sec.; both determined at 60 deg. F. and 500 grams weight. The photomicrographs were taken at a magnification of 1,000 diameters.

Although other structural properties affect the consistency of the emulsion, particle size (average diameter of oil globules) is important.

Some of the leading brands of mayonnaise, purchased on the open market and measured at 60 deg. F. with a 500-gram weight, showed consistencies ranging from less than 3 sec. to 287 sec.

If the measurement of the consistency of mayonnaise is to be placed upon a quantitative basis, some means must be provided to check the instrument occasionally against a fixed standard. A means must also be established whereby different manufacturers may check and compare their respective instruments.

To this end the instrument described above was calibrated with C.P. glycerin (specific gravity 1.26 at 68 deg. F.) at 60 deg. F. and 500-gram weight. The consistency of the glycerin under these conditions was 3.9 sec. In using glycerin as a standard it is necessary to state its specific gravity, as it varies slightly. Glycerin used as a standard should be kept in a tightly stoppered bottle, as it is hygroscopic and absorbed moisture will change its consistency slightly.

It is hardly necessary to say that the instrument must be carefully cleaned after each series of determinations, as the accumulation of any vegetable oil on the inside of the tube or on the plunger rod bearing, or the slight

rusting of either of these latter parts, will seriously affect the readings of the instrument.

Another material of possible use as a standard is cotton-seed oil. The change in consistency of cotton-seed oil—with changes in temperature and in weights used—was determined by a series of tests.

Further investigation will probably reveal a standard better than either glycerin or cotton-seed oil.

As mentioned above, the stability as studied in this investigation had reference only to that which would be parallel to stability during handling and transportation, and at elevated temperatures, and not to stability when exposed to temperatures below freezing. However, it is not impossible that some relationship may be found between general stability, as determined with the mobilometer, and stability to freezing temperatures.

Referring again to Fig. 4, it is evident that with each successive plunge some change is taking place in the mayonnaise emulsion, causing a decrease in the consistency. It is also evident that though the consistency remains practically constant for about fifteen plunges (from No. 6 to No. 21) it starts to drop again rapidly. After about 80 plunges the emulsion is completely broken, and on standing a short time it separates into layers. The number of plunges required to reach this point has been studied under different conditions of aging and temperature. The form of curve of Fig. 4 is typical for a large percentage of the emulsions studied, although the "flat" region is sometimes hardly more than suggested.

By microscopic examinations of (1) an original emulsion, (2) the emulsion after 12 plunges, (3) after 18 plunges, and (4) after 28 plunges, the progressive increase in the size of the oil globules is made evident. The consistency in each case, expressed in seconds, was as follows: original, 20.2; after 12 plunges, 6.4; after 18 plunges, 3.1; after 28 plunges, 1.2.

Some emulsions were examined—among them several commercial brands—which did not break down completely under the standard conditions of testing—(60 deg. F. and 500 grams' weight). Instead they reached a minimum consistency below which they did not fall even after a comparatively large number of plunges; at the same time they were not broken down, in the usual sense of the term.

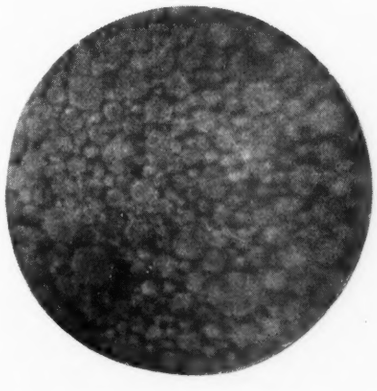
A possible explanation of the breaking-down effect of repeated plunges is that with each plunge the oil globules are more or less distorted because of their being forced through the orifices in the piston, especially if they are relatively large, and the protecting film of emulsifying agent (egg yolk) is strained and stretched, and in some cases ruptured. This rupture causes coalescence of two or more globules to form a much larger globule. A continuation of this process ultimately causes "breakdown"; that is, a practically complete separation of the oil from the other ingredients.

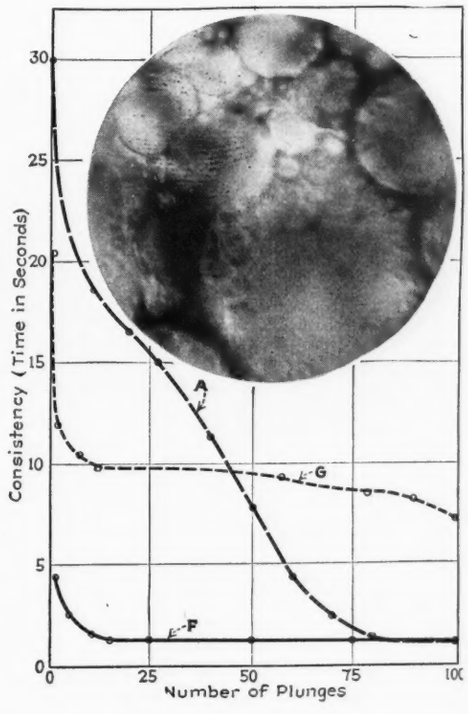
The effects of the time and temperature of aging of the emulsion have been referred to previously in discussing consistency. In this investigation samples of mayonnaise were stored at three temperatures—40 deg. F., 75 deg. F., and 98 deg. F., corresponding to temperatures of the average electric refrigerator, room temperature, and summer heat. The time periods varied from one-half hour to three days. After this period the changes were comparatively slight.

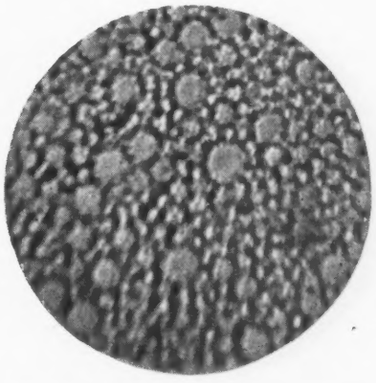
Fig. 7 shows the breakdown curve for the original emulsion one-half hour old, and for three samples of the same emulsion held 72 hours at temperatures of 40 deg., 75 deg., and 98 deg. F. The number of plunges required to effect complete breakdown were, respectively, 82, 50, 35, and 21, all determinations being made at 60 deg. F. and with 500 grams' weight.

These curves show that with this particular emulsion, stability, as shown by these tests, decreases noticeably, regardless of the aging conditions; also that storage at elevated temperatures causes a much greater drop in stability than storage at room or refrigerator temperatures.

Figs. 8, 9, and 10—photomicrographs of the emulsion after storage for 72 hours at temperatures of 40 deg., 75 deg., and 98 deg. F., show the effect on particle size of these respective temperatures of storage.







Figs. 11-13—Photomicrographs of three leading brands of commercial mayonnaise (purchased on the open market) taken at a magnification of 1,000 diameters.
Fig. 14 (Center)—Graph showing stability curves of the three emulsions. The poorest is shown by the solid line and the photomicrograph above; that of indifferent quality by the dotted line and illustration at right; and a typical high-grade product by the broken line and photomicrograph at left.

Figs. 11, 12, and 13 are photomicrographs of leading brands of commercial mayonnaises purchased on the open market. These photomicrographs, like all others in this paper, were taken at a magnification of 1,000 diameters. A stability curve is presented with each emulsion photograph. In some cases the emulsions were completely broken, whereas in others the consistency reached a constant value without noticeable breakdown.

Exclusive of the commercial brands examined, the emulsions from which the curves and other data were obtained in this investigation contained no stabilizers. As edible stabilizing materials are coming into more general use in the mayonnaise industry, and as they doubtless exert a pronounced effect upon the consistency and stability of the emulsion, as determined with the improved form of mobilometer used in this investigation, it is planned to investigate their effect.

Although the form of mobilometer described herein is satisfactory for determinations of initial consistency, its operation in studying stability is somewhat tedious. Accordingly a new instrument has been designed for studying stability—one that employs much the same principles but is more rapid in its operation, being less tedious for the operator.

Summary

1. The improved form of Gardner-Parks mobilometer affords a useful instrument for measuring the consistency of mayonnaise dressing.

2. The consistency is taken as the time in seconds required for the plunger to fall the distance between the two reference marks on the plunger rod.

3. Consistency must be taken on the first plunge, as its value decreases with each succeeding plunge.

4. Consistency increases considerably with decrease in temperature and decreases with increase in temperature.

5. In plant control work, consistencies should all be run at a given temperature. This is best secured and maintained by partly immersing the mobilometer in a constant temperature bath, such as described.

6. A temperature of 60 deg. F. is suggested as a standard for determinations.

7. Increased values for consistency are obtained with lighter total weights of the mobilometer plunger and vice versa. The increase is rapid for weights below 300 grams, and the decrease fairly slow for weights above 500 grams.

8. A total weight of 500 grams is suitable for general work. For mayonnaise of unusually high consistency a total weight of 1,000 grams is more satisfactory.

9. Consistency of the emulsion decreases with age: it appears to approach a constant value after about 72 hours.

10. Lowering of the consistency is more pronounced at elevated aging temperatures (about 98 deg. F.) than at room (75 deg. F.) or refrigerator temperatures (40 deg. F.).

11. Consistency will decrease rapidly as moisture content increases, other factors remaining constant.

12. Consistency varies considerably among different commercial brands of mayonnaise, ranging from 2 to approximately 300 seconds in the samples examined, determined at 60 deg. F. with 500 grams' weight.

13. Cotton-seed oil or glycerin of specified gravity is suggested for checking or comparing instruments.

14. Stability as determined in this investigation has little if any relation to stability against freezing temperatures, but should correspond with the ability of the emulsion to resist breakdown caused by handling, transportation, or elevated temperatures.

15. As consistency is decreased by repeated plunges in the mobilometer, the oil particles increase in size.

16. A point is finally reached in this process where the consistency becomes constant.

17. The number of plunges to reach this point affords a measure of the stability of the emulsion.

18. At this point the emulsion may or may not be "broken" in the usual sense of the term, depending upon its composition, particularly with regard to stabilizers.

19. Stability of an emulsion decreases somewhat with age. The rate of decrease becomes less until it appears to approach a constant value some time after 72 hours.

20. This decrease is more pronounced at an elevated temperature (98 deg. F.) than at room (75 deg. F.) or refrigerator temperature (40 deg. F.).

Acknowledgment

The authors of this paper wish to thank Mr. C. E. Maier, Hazel-Atlas Glass Company, for his valuable assistance.

Census of Manufactures—1927

BECAUSE of changes in compilation methods, the industrial census data for 1927 are not fully comparable with those for earlier years. (a) After making the necessary adjustment for paper and wood pulp the slight increase in aggregate value of products shown in the subjoined table becomes a decrease of two-tenths of 1 per cent. Inasmuch as prices generally declined during the period 1925-1927, it is a safe assumption that in quantity of products there was a moderate increase.

Industry	Census Year	Number of Establishments	Wage Earners (Average for the Year)	Value of Products at Factory Prices
All industries	1927	191,863	8,351,257	$62,713,947,403
	1925	187,224	8,381,511	62,668,259,591
Food and kindred products	1927	49,786	679,158	10,999,789,550
	1925	47,947	662,010	10,373,082,162
Textiles and their products	1927	26,845	1,692,473	8,964,143,064
	1925	24,450	1,628,283	9,126,154,902
Chemicals and allied products	1927	8,939	394,817	6,404,914,348
	1925	8,871	381,075	6,438,027,055
Iron and steel and their products not including machinery	1927	6,346	835,091	6,199,252,444
	1925	6,068	851,270	6,461,668,061
Machinery, not including transportation equipment	1927	12,038	886,344	5,367,014,850
	1925	11,807	858,843	5,020,281,100
Transportation equipment, air, land, and water	1927	2,537	494,905	4,702,378,136
	1925	2,778	559,578	5,451,753,433
Paper, printing, and related industries	1927	28,404	553,040	4,638,571,773
	1925	26,553	536,766	4,143,684,899
Lumber and allied products	1927	20,163	866,581	3,457,427,173
	1925	21,926	921,266	3,689,126,705
Metals and metal products, other than iron and steel	1927	6,658	270,665	2,668,696,686
	1925	6,924	275,292	2,833,769,702
Leather and its manufactures	1927	4,263	316,421	1,868,320,020
	1925	4,243	314,025	1,763,709,361
Stone, clay, and glass products	1927	8,673	350,397	1,612,548,765
	1925	8,478	353,036	1,640,651,985
Railroad repair shops	1927	2,309	428,291	1,289,695,158
	1925	2,363	457,755	1,332,679,079
Rubber products	1927	516	141,997	1,225,077,114
	1925	509	148,382	1,257,997,707
Tobacco manufactures	1927	2,156	129,299	1,163,768,379
	1925	2,623	132,132	1,091,000,981
Musical instruments and phonographs	1927	431	42,985	226,362,120
	1925	461	46,980	231,686,552
Miscellaneous industries	1927	11,799	268,793	1,925,987,823
	1925	11,223	254,818	1,812,985,907

(a) The figures for 1925 for "All industries" and for "Food and kindred products," as presented in this table, differ from those published previously because of the exclusion here and the inclusion in the 1925 report of data for the poultry killing and dressing industry. The figures for "Textiles and their products," "Lumber and allied products," "Leather and its manufactures," "Rubber products," and "Miscellaneous industries" for 1925 differ because of the transfers of establishments manufacturing certain classes of products from one group to another.

Improving the Quality of Cheddar Cheese

by Pasteurizing the Milk

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FOR MANY YEARS manufacturers of cheddar cheese in the United States have debated the technical importance of the natural bacterial flora of milk, a relationship that has been studied extensively both in Europe and the United States.

The findings of research have demonstrated that bacteria play an important role in the production of high-quality cheese. It has been definitely established that certain types are highly undesirable for cheesemaking purposes; also that the normal development of cheddar cheese depends largely upon the growth of the proper bacterial flora.

In some European countries a method of allowing part of the cheese milk to remain at a high temperature for eight or more hours, so as to develop a bacterial flora, is practiced with success. The quality of the cheese is high, effective control of the milk supply apparently making this method possible. In the United States, control of the quality of milk in the cheesemaking districts is difficult. Often no system of sanitary inspection is provided; and frequently, for economic reasons, surplus milk of inferior quality is forced upon the cheese-making industry.

A general survey makes it apparent that pasteurization offers the most economical means of preparing milk for cheese production—principally because such action reduces all milk to a comparable basis from the viewpoint of bacterial flora and numbers. Efficient pasteurization of milk for cheese-making purposes reduces the average count of bacteria to less than 75,000 per c.c. Comparison of this drastic reduction in count with the bacterial content of the milk after it has been innoculated wtih the culture of the desired lactic acid-producing organisms renders evident the fact that all properly pasteurized milk is on a comparable basis for future use in the manufacture of cheese.

From 1923 to 1926 I was associated with Dr. G. J. Hucker[1] at the New York Agricultural Experiment Station in conducting a study of the relationship of pasteurization to the production of high-quality cheese. Milk was obtained from two herds of cows, one producing milk of high fat content and low bacteria count, and the other a low fat content milk with a rather high bacteria count. In the manufacture of cheddar cheese, the milk from each herd was used both separately and as a mixture of the milk from both herds, batches of cheese being made from the raw milk as well as after pasteurization. The cheeses were given identifying marks and placed in storage, to be passed upon later by competent, non-partial judges.

In connection with pasteurization it was possible to study the influence of cooling upon the quality of milk for cheese production. This should be regarded as a means, apart from pasteurization, of regulating the bacteria count of the milk. The temperatures of holding employed were 40 deg. F. and 70 deg. F. The bacterial growth at the 40 deg. F. temperature of holding for 18 hours was slight, whereas the organisms developed freely at 70 deg. F. From these observations it is apparent that the project developed into a study of the effect of cooling and pasteurization of milk upon the quality of cheddar cheese.

In the actual manufacture of the cheese, exact control of the procedure was of paramount importance. Preliminary experimentation demonstrated that the conditions prevalent in cheese factories would prevent conducting the study at such establishments, because accurate control of different lots of cheese made from the same milk was not possible. Hence we adopted and developed the idea of making a 3-lb. cheese from a small quantity of milk, in this way carefully controlling all manufacturing steps.

Dealing with the question as to the possibility of making small cheese equal in quality to factory-made cheese, we prepared cheese according to the laboratory method, entering it in competition with factory-made cheese. The small experimental cheese, be it noted, equalled in quality the highest scoring commercial cheese exhibited at the 1925 New York State Fair at Syracuse. Another small experimental cheese received a silver medal at the National Dairy Show, Indianapolis, Ind., in 1925—all of which demonstrates that in the manufacture of small cheese it is possible to produce high-score cheese from good quality milk.

In judging the experimental product, 50 points were allowed for a perfect score on flavor, 25 for body and texture, and 25 for color and finish. The judges were members of the Dairy Staffs at Cornell University, the University of Wisconsin, and the New York Agricultural Experiment Station.

From the accompanying tables, in which the summary scores of the cheese are recorded, it is evident that the highest quality cheese was made from cooled and pasteurized milk.

Table I—Summary of Scores of Cheese Made From Raw and From Pasteurized Milk Held at 40 Deg. F. and at 70 Deg. F.

Herd No.	Number of Scorings	Average Score of Cheese Made From Raw Milk Held at 70°F. for 18 Hours: Flavor	Body and Texture	Total Score	Average Score of Cheese Made From Raw Milk Held at 40°F. for 18 Hours: Flavor	Body and Texture	Total Score	Average Score of Cheese Made from Pasteurized Milk Which Had Been Previously Held at 70°F. for 18 Hours: Flavor	Body and Texture	Total Score	Average Score of Cheese Made from Pasteurized Milk Which Had Been Previously Held at 40°F. for 18 Hours: Flavor	Body and Texture	Total Score
1	36	38.73	20.53	83.83	39.10	20.40	84.30	40.60	21.30	86.80	41.70	21.60	88.23
2	24	36.00	18.80	81.15	36.30	18.80	81.45	37.15	19.00	82.30	37.30	19.00	82.15
Total	60	37.60	19.84	82.76	37.98	19.78	83.16	39.25	20.38	85.00	39.94	20.58	85.26

In 186 comparisons of cheese made from raw and pasteurized milk it was demonstrated that pasteurization improved the cheese score two points. This differential is confirmed by analysis of the table.

Extensive study of the pasteurization of milk for the cheese industry was first conducted by Sammis and Bruhn[2] at the University of Wisconsin. These investigators found that the yield of cheese from pasteurized milk was greater than that obtained from raw milk. Although the work by Sammis and Bruhn was conducted before 1912, the adaptation of pasteurization to the cheese industry has been slow in this country. New Zealand cheese manufacturers soon developed the pasteurization program of Sammis and Bruhn, with slight modifications, the improved quality of their cheese over a period of years being the direct result of pasteurization of milk for cheese making.

The method of pasteurization is probably the greatest factor in retarding its universal adoption. This, in turn, does not so much involve the problem of quality as it does the factor of cost, speed, and efficiency. Because of certain controversy over an improved method of pasteurizing milk for the cheese industry, the subject has been studied by Price and Prickett,[3] who compared flash, holder, and a special method of pasteurization. During the course of these studies cheese made from milk pasteurized by these methods was compared with cheese made from the normal raw milk.

The flash method consisted of heating the milk to a temperature ranging from 160 deg. to 165 deg. F. in a flash heater and then immediately cooling the milk over a surface cooler.

In the holder method the milk was heated in a holding vat to a temperature of 145 deg. F. This temperature was maintained for a period of 30 min., after which the milk was cooled to 88 deg. F.

The special method provided for a heating temperature ranging from 145 deg. F. to 150 deg. F. through a flash heater. The milk was held at approximately this temperature until all of the milk had passed over the heater. The temperature was not allowed to drop below 142 deg. F. After all the milk had passed over the heater its temperature was reduced to 88 deg. F.

With these several processes available, milk of inferior quality was made into cheese. At the completion of the work, the cored cheese, both fresh and aged, was examined by experts.

Tabulation of the scores indicated that pasteurization improved the quality of cheddar cheese about two points. However, the significant result of this work is the conclusion that either method can be used satisfactorily in the pasteurization of milk for cheddar cheese making.

The results of Price and Prickett in this connection are of far-reaching importance, their results showing plainly that the manufacturer of cheddar cheese from pasteurized milk has at his disposal three methods of pasteurization. This should permit many cheese factories to adjust their installation and costs so as to make possible the application of milk pasteurization to the manufacture of cheddar cheese.

Although several methods of pasteurization are applicable to the cheddar cheese industry, obviously the method best suited to the economic needs of the plant should be adopted. In this connection it is well to remember that in the holder method considerably more time is required than in a flash system of pasteurization.

The employment of a regenerative system furnishes a convenient method of pasteurizing milk for cheddar cheese. This is due mainly to the fact that it is possible to regulate the temperature by means of tempering coils, so that the milk will flow into the cheese vat at a temperature suitable for cheese making.

A reproduction of a regenerative unit is represented in Fig. 1. Ordinarily these units are constructed with eight heating tubes, ten regenerator tubes, and four tempering tubes. However, occasionally for the sake of added capacity the unit is constructed with ten heating tubes, twelve regenerator tubes, and four tempering tubes. These units are built in capacity range to pasteurize 8,000 to 15,000 lb. of milk per hour.

The milk enters the regenerative system through the bottom tube of the regenerative coil. As it passes upward it is heated by the hot milk flowing on the outside of the regenerator coil. In this way it is possible to raise the temperature of the raw milk to approximately 135 deg. F.

The milk is forced out of the top tube of the regenerator and is piped over to the distributing pipe on the top of the heater section. It then flows down over the heater section and is heated to 165 deg. F. by a counter-current circulation of hot water, actuated by a pump. As this milk flows down over the regenerator it is cooled to approximately 90 deg. F. by the raw milk entering the inner part of the regenerative system.

At this stage, tempering coils, adjusted with hot or cold water, are employed to make the final temperature adjustment for setting the milk.

Although this method is efficient, it is not usable under all conditions. In cases requiring smaller installations it is well to remember that holder vats with a capacity range from 100 to 1,000 gal. are available.

Extensive experiments relating to the pasteurization of milk for cheese-making purposes have been conducted at the University of California. In commenting on the results of the studies, Dr. C. L. Roadhouse, head of the dairy department, stated in a personal interview, that the manufacture of cheddar cheese at the college creamery would be confined to the manufacture of cheese from pasteurized milk.

It is not my purpose to discuss in detail the pasteurization of milk for the cheese industry in general. Our results at the New York Agricultural Experiment Station, and the other references cited, deal only with the manufacture of cheddar cheese from pasteurized milk.

Besides the technical advantages which render the quality of milk for cheese purposes more nearly uniform, pasteurization of milk for cheese-making purposes has the additional advantage of being conducted at a temperature high enough to destroy the pethogenic organisms present in milk.

Pasteurization Used for Other Types of Cheese

Pasteurization of skim milk for cottage cheese making has been used by that industry for many years, because of the fact that not only it improves the flavor and texture, but also it increases the keeping quality of the cheese. It is indeed difficult to find a concern making large quantities of cottage cheese that does not pasteurize the skim milk before setting it with a pure culture of lactic-acid producing organisms.

Experimental studies relating to the use of pasteurized milk for brick, Swiss, Camembert, and other varieties of cheese have been conducted. Some of these cheese varieties have presented a new problem involving the heat treatment of milk. Apparently, relatively high temperatures cannot be employed in pasteurizing milk for certain types of cheese because of the effect upon the curd. There is, however, a practically unlimited field for the research worker in the utilization of pasteurized milk for various types of cheese.

Although cheese making has been an art, developing conservatively during the last 25 years, it has arrived at a position which requires scientific effort to further its interests. With our present-day methods of conducting affairs on a large scale, the field is becoming limited for miscellaneous cheese of a wide-quality range.

In addition to making it possible to improve the quality of cheese, pasteurization of the milk constituent has gained in another field of endeavor. To a somewhat limited extent it has paved the way for studies relating to the preparation of small packages of cheddar cheese. One may venture the opinion that greater progress can be achieved in the packaging of cheese made from pasteurized milk than in that from raw milk.

Packaging cheddar cheese without altering its body and texture has been a problem confronted with two obstacles: evaporation of moisture from the cheese, and the development of mold. It is questionable whether pasteurization of the milk improves the moisture-holding

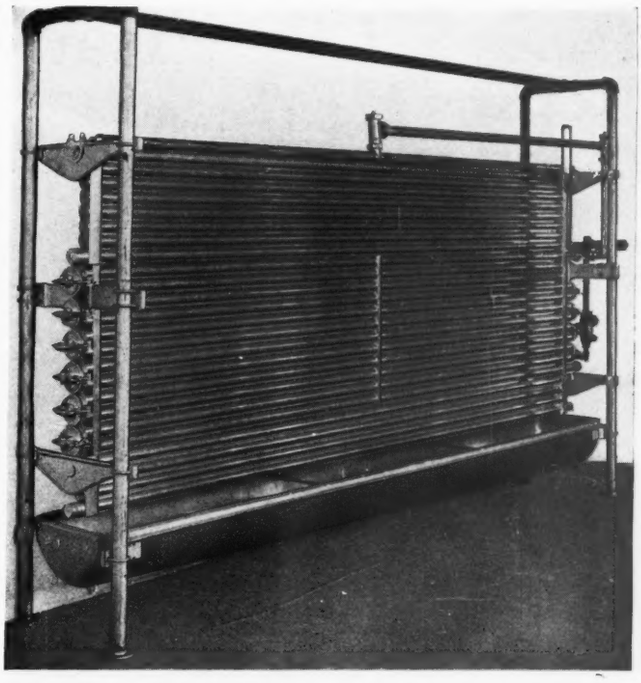

Fig. 1. An installation of a Cherry-Burrell regenerative system suitable for flash pasteurizing of milk for cheddar cheese purposes.

qualities of cheddar cheese; however, it has been definitely established that such pasteurization is a positive aid in retarding mold growth.

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Official Ruling on Labelling Table Sirups

A SUMMARY of the rulings on the labelling of table sirups under the Food and Drugs Act has been issued by the Food, Drug and Insecticide Administration, United States Department of Agriculture, Washington, D. C., for the guidance of manufacturers and others who ship table sirups in interstate or foreign commerce.

The terms "Cane," "Cane Sirup" or "Sugar Cane Sirup" should be applied only to sirup made by the evaporation of the juice of sugar cane or by the solution of sugar cane concrete, according to the rulings. These terms should not be used to designate a sirup made from sugar. There is no objection to designating a sugar sirup as "Cane Sugar Sirup" if it is made from cane sugar and water, and contains not more than 35 per cent of water.

When sugar sirups or mixtures of sugar sirups and corn sirup or other mixed sirups are artificially flavored and colored in imitation of maple sirup, they are regarded as imitations under the law and should be labeled as such. A statement such as "Imitation Maple Sirup, Contains Sugar Sirup, Corn Sirup and Imitation Maple Flavor and Color" will be acceptable if suitably placed on the label and if the article has the indicated composition. Coined words and statements or designs which are misleading in any particular should not be used on the labels of imitation maple sirups.

Declarations of quantity of contents on the labels of table sirups should be expressed in terms of liquid measure rather than in terms of net weight. The presence of added sulphur dioxide should be plainly declared on the labels of sirups which contain this chemical. Copies of the complete summary of rulings on the labelling of table sirups together with copies of the federal Food and Drugs Act and regulations issued thereunder may be obtained upon request.

INFECTED ICE Causes Discoloration of Halibut

An Important Diagnosis

By F. C. HARRISON and W. SADLER
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THOSE WHO HAVE READ Kipling's "Captain Courageous" will have some idea of the picturesque, romantic, and perilous life of the cod fisherman on the Grand Banks of Newfoundland and will have absorbed some of the mystery and eeriness of those who go down to the sea in ships. Second only to this in popular fancy is the lot of the halibut fisherman on the broad waters of the Pacific—the toiler who obtains his fare along the great shelf that extends out from the west coast from Unalaska to Vancouver, with depths of thirty to fifty fathoms, until it plunges suddenly down a thousand fathoms or more.

On this ledge, or shelf, especially where it is rocky, lives the largest of the flat fishes—the halibut: famous for its size, its flavor, and in general its keeping quality; a fish that always commands a good price, and which is shipped in a fresh or frozen state to all the markets of the North American continent.

Although more than 50,000,000 lb. of halibut are landed annually on the Pacific Coast, this important food fish is also found in the Atlantic. In cold northern waters it is most aboundant, but in recent years it has become somewhat scarce in the North Sea; hence fishing vessels have long voyages to make in order to obtain enough fish for the northern European markets.

Methods of catching and marketing halibut are practically uniform. Larger vessels exploit the more distant fishing grounds (voyages of ten to fourteen days are usual), while the smaller vessels obtain their catch nearer their marketing port.

Of the actual technique used in catching, nothing need be mentioned, but the methods used after the fish are dumped or thrown off the hooks are related, because they have an important bearing on keeping quality. By means of a short gaff the fish are taken from the deck pen and placed on a low table or hatch. If not dead they are killed by a blow on the head from a club. When they are slit, the viscera is removed with a small scraper attached to a piece of hose. The cavity is then washed out, all blood being removed. Care is taken to leave the slime on the fish.

After the fish have been cleaned and eviscerated they are packed in bins in the hold, with sufficient chopped and broken ice to fill the poke and provide a liberal amount between and around the fish.

Ice for packing the fish is taken aboard immediately before the boats leave port. With one exception, this ice is obtained from ice manufacturing or cold storage plants. The one exception is where ice is obtained from bergs. Seldom is this source of supply used, however, for it requires both the presence of bergs and a shortage of artificial ice in the boats.

When the bins are filled, the vessel hurries to port to sell its cargo, the captain being required to give a detailed estimate of his catch. When the fish are sold at auction, two prices are given, the higher price for the medium-sized fish and the lower for the small and very large fish. After the sale the captain places his boat alongside the wharf of the company to which he has sold, and unloading commences.

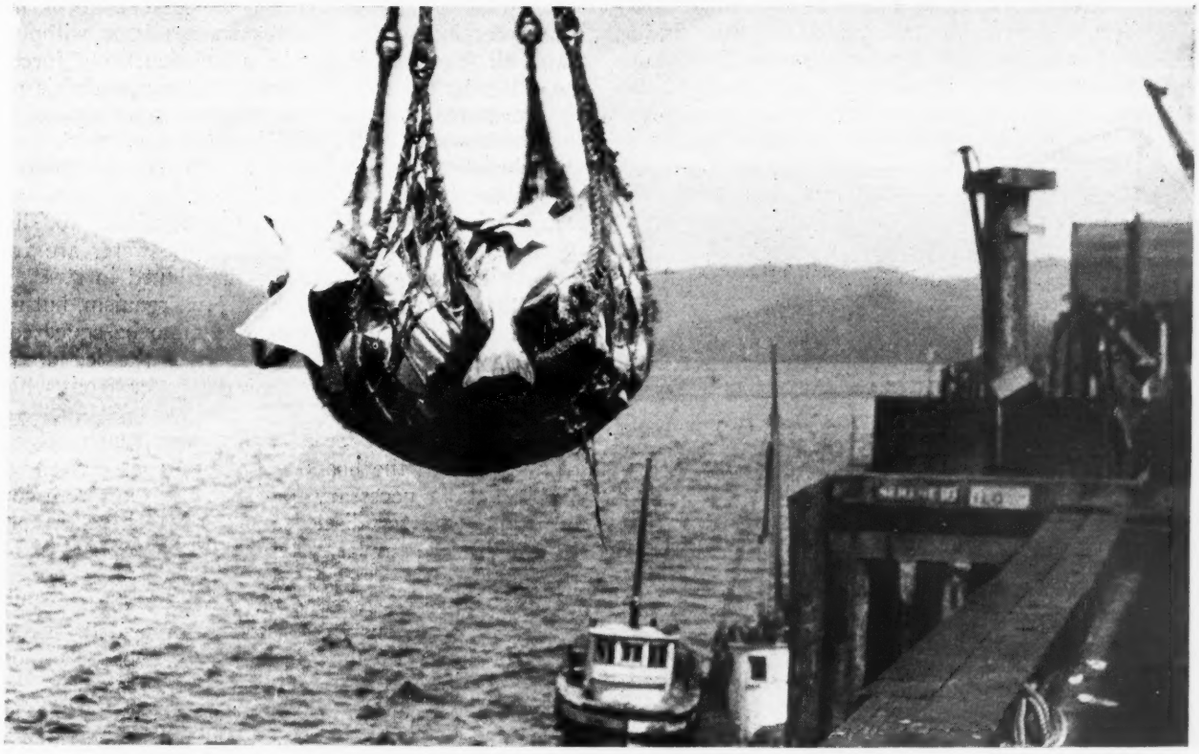
The fish are thrown into a stout net, hoisted to the wharf, and dumped on a large trestle table. Two of the crew stand on the table, pick up the fish with a short hook in the left hand, and decapitate it with a heavy knife held in the right. The fish are thrown in front of the grader, who stands at one end of the table. This man seizes each fish, judges its quality, pulls out any ice in the poke, and places the fish in the scale. (Two hundred pounds makes a boxful.) Other men take the fish from the scale, ice the boxes, re-ice the pokes, nail on the lids, and label. Heavy fish are put into larger boxes.

While unloading is going on, other members of the crew are washing the loose boards that form the sides or ends of the bins, using a stiff broom and fresh water from hose put on board. All surplus ice that has been in contact with the fish is hoisted out and dropped overboard. As soon as all the fish are landed, the hold is washed out, the bilge water is pumped out, and the washed bin boards are replaced.

Examination of the fish as they are hoisted out of the hold and dumped on the trestle table shows that they are covered with a thick and slightly mucilaginous slime. Both the dark upper surface and the white under surface, or belly, are coated with it. Usually, the white surface is discolored as well by a yellow, or greenish-yellow, coloration. Where there is much slime, the color seems to be in the slime; when slime is not thick the color is on the skin—in fact, at times it seems bitten into the skin. Sometimes both slime and skin are yellow, varying in extent and degree. With marked discoloration there is often softening, and when either is bad the fish is rejected by the grader.

Fish from the bottom of the bin—those caught first—are often discolored more than the ones at the top—those caught last. Practically every cargo contains discolored fish, which means that no locality from Unalaska to the Hecate Strait produces fish free from the affection.

Analytical preparations from the slime and from the



Way in which fish are landed from boat to the wharf, with power-driven fishing boats in foreground

discolored skin, examined under a microscope magnifying a thousand diameters, show the presence of many bacteria of different shapes and sizes. In an amount of slime so small that it could be contained in the eye of a needle, there are many thousands. But this examination does not prove that these bacteria are responsible for producing the yellow color on the fish; hence recourse must be made to some simple experiments.

A sound fish, which showed no discoloration, was taken to the laboratory and carefully washed with a piece of absorbent cotton, previously dipped in sterilized water. This removed the slime, leaving the belly white and smooth.

After several cleanings of this kind with sterilized water, a little slime from a fish that showed characteristic discoloration was smeared in parallel streaks across the white surface of the fish. The whole fish was then shielded by a clean damp towel, so arranged that it did not touch the fish. The next morning the fish was examined. Where it had been streaked with slime there was a band of characteristic yellow, or greenish-yellow, just like the color of naturally affected fish. Between the bands the color remained white. This simple experiment, repeated several times, proved that the discoloration was due to an infection, for it could be reproduced by inoculation from an infected fish.

The next step was to isolate from the mass of bacteria living in the slime, or present on the fish, the peculiar organism or organisms responsible for the production of the color.

By appropriate bacteriological methods, and using a special medium made from halibut, no trouble was experienced in isolating an organism that produced a fluorescent color (a mixture of green and yellow) on the halibut jelly. This organim, *Pseudomonas fluorescens,* was picked out from a large number of different kinds that were present in all the slime examined.

The organism was grown in pure culture and then tried on another washed clean fish. The experiment was carried out as before, excepting that the fish was streaked with some of the pure culture growing on halibut jelly. In eighteen hours the streaked portions presented the greenish-yellow color, the other parts of the fish remaining white. From the infected and yellowed area the organism was recovered again in pure culture, and thus were established the following points, called the laws of proof:

1. Constant association of the greenish-yellow organism with the infected discolored halibut.
2. Isolation of this organism in pure culture.
3. Production of the characteristic color on halibut with the pure culture.
4. Re-isolation of the organism from the artificially infected fish.
5. Growth and cultural peculiarities of the re-isolated organisms exactly comparable with the original organism.

This organism, which is called a bacillus, is fairly well known. It is motile, produces a greenish-yellow color

Beheading halibut preparatory to packing and shipping

(hence its name *fluorescent*), and is a customary inhabitant of fresh water ponds, lakes, and streams. It has the power of liquefying, or digesting, foodstuffs containing appreciable amounts of protein. It can digest the curd of milk, liquefy or partially decompose gelatin, and

Halibut inoculated with the green fluorescent organism from 5 separate ice supplies, showing bands of color; greenish-yellow in real life

break down fish muscle and digest it—that is, cause it to become relatively soft and liquid. The organism can grow comparatively rapidly at very low temperatures—34 deg. to 38 deg. F. Isolations of this organism have been made from more than 100 specimens of halibut, obtained from as many different boats.

As the green organism was known to be an inhabitant of water, and particularly of waters containing much vegetable matter, such as decayed leaves, wood, and the usual brokendown vegetable matter of the forest, the water was examined and was found to contain many of these organisms.

Along the coast all ice manufactured in refrigerator plants is frozen from these waters, and as the freezing process does not destroy the bacteria they remain alive in the ice. As a matter of fact, demonstrated experimentally, refrigeration or artificial ice usually contains more bacteria than does good natural ice.

Refrigerator ice is made from water run into iron rectangular containers, which are immersed in brine. The water in these iron tanks freezes from without inward, all vegetable matter in suspension being forced to the center by the freezing action. Because of this material the unfrozen core is pumped out from time to time and fresh water added, the freezing process continuing until the whole mass is frozen. The tanks are then hauled out of the brine and dipped for a few minutes in hot water, when the ice block, weighing about 400 lb., is turned out. Thus the bacteria in the water are frozen in the block and are unevenly distributed in it.

Natural ice may contain the green organism, but under natural conditions the bacteria seem to be squeezed out during freezing, and in consequence the ice does not contain as many organisms as the water from which it formed.

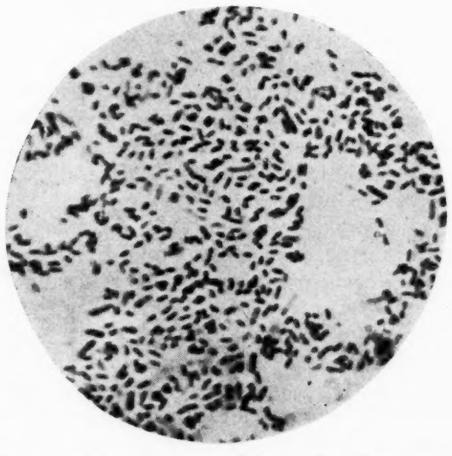
Many samples of ice coming direct from refrigerator plants or from the boats were examined. After taking all precautions necessary to insure freedom from contact infection, analyses disclosed the greenish-yellow organisms in all the samples. Repeatedly they were isolated in pure culture.

With some of these organisms the direct infection experiment previously discussed was repeated. Five different cultures of the greenish-yellow bacillus, coming from five different ice supplies, were streaked in parallel lines across the write side of a fish. It was then covered with a damp towel and allowed to remain thus overnight, the temperature being between 55 deg. and 60 deg. F. Next morning there were five distinct bands of greenish-yellow color where the organisms had grown and spread, with clear white spaces between.

To the left is a photograph of this fish. The difference does not show well in a photograph because of the difficulty of photographing a light greenish-yellow, but the appearance of the actual fish was striking. This experiment shows clearly that the organism coming from the ice produces the characteristic greenish-yellow discoloration.

By means of sterilized swabs of cotton placed in sterilized glass tubes, rubbings were obtained from practically all the objects with which the fish came in contact, and samples of materials of a portable sort obtained in sterilized flasks, both being taken to the laboratory for examination with the following results:

1. Bilge water from several boats was found to contain large numbers of bacteria, often more than 10,000,000 bacteria per drop, of which 10 to 15 per cent, or 1,000,000



The greenish-yellow organism—Ps. fluorescens, 1,500 magnifications

to 1,500,000, were the greenish-yellow organism. The drainage from the ice, together with some of the slime (which affords a highly nitrogenous food for the bacteria), accounts for this vast number.

2. Bin boards showed large numbers of the greenish-yellow organisms, as was demonstrated by swabbings therefrom—attributable to the fact that they had been washed with fresh water in which the organism is naturally present.

3. The floor of the hold, on the evidence of carefully made swabbings, showed large numbers of this organism.

4. Landing net swabbings showed that it was heavily infected—as would be expected.

5. Trestle tables on which the fish were dumped before being beheaded showed large numbers of the organisms. Splinters or swabs showed that the wood was impregnated with many organisms in which the greenish-yellow predominated. In fact, in certain lights, and when the table was being washed, it often showed a distinctly greenish-yellow appearance.

6. Gloves or mitts worn by the grader taken to the laboratory contained large numbers of the greenish-yellow organism. In all these cases, therefore, there was heavy infection, dependent upon the amount of food present for the organism to live upon.

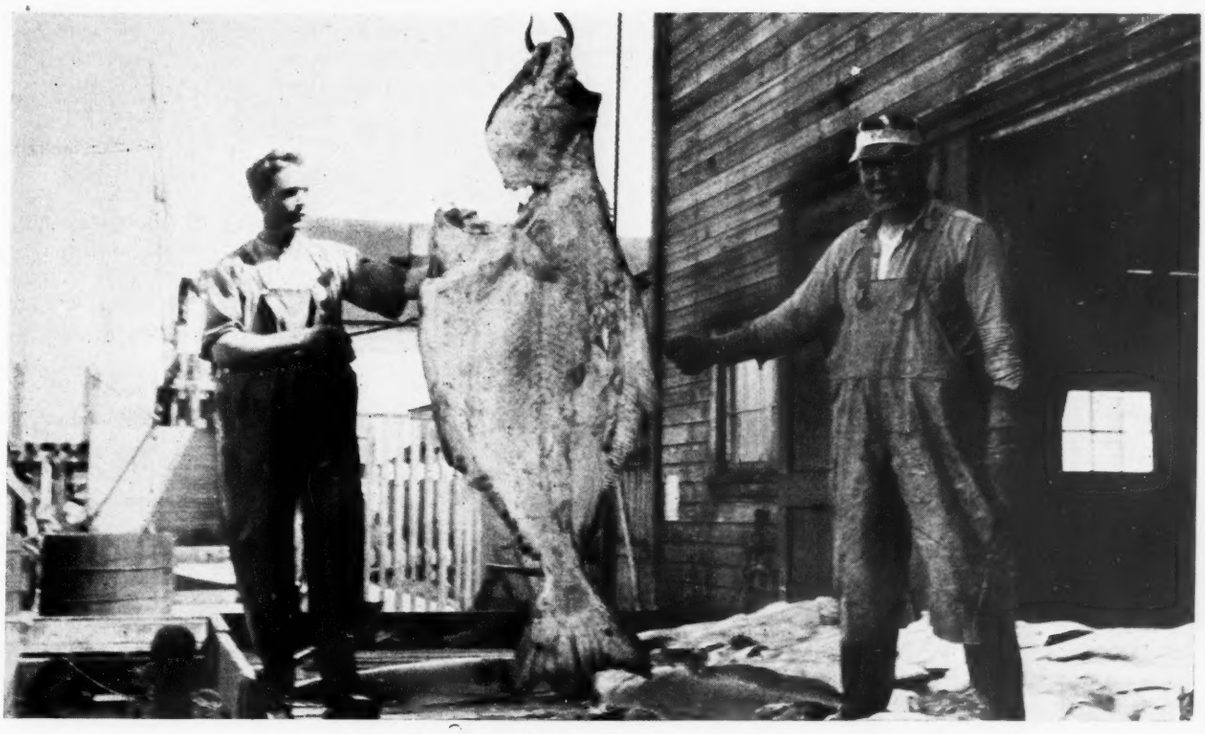
Having described in sequence how these fish become infected with the greenish-yellow bacillus, in order to show that the ice, or the water from which the ice was derived, was the only source of this organism, it was necessary to obtain a fish direct from the sea before it came into contact with ice, boat, or any other material.

Through the kindness of Captain Hendricksen, of the "Gibson," we were enabled to make a short voyage and obtained a number of halibut of various sizes from a bank in latitude 54 deg. 19 min. and longitude 130 deg. 37 min. A number of skates of gear baited with herring were dropped and after two hours were hauled in by the gurdy. As the fish came to the surface, the gurdy was stopped and the halibut was gaffed through the head, turned with the belly side out. Before it touched bulwark, deck or anything else, the side was rubbed hard with a sterilized, absorbent cotton swab, which was immediately put into a sterilized test tube. In this way some two dozen halibut of varying sizes were swabbed. Each swabbing was placed in a separate tube. The tubes were then at once taken to the laboratory and carefully cultured in the halibut medium. After a sufficient time had elapsed, they were examined for the presence of the greenish-yellow bacillus. In no instance was this organism found. Other bacteria, however, were found that were on the surface of the fish—bacteria which undoubtedly increase in the slime after the fish is dead, yielding products that will cause deterioration and interfere with the keeping qualities.

The significant fact is the absence of the greenish-yellow organism from the fish as they are taken out of the sea: Ice, therefore, or the water from which the ice is derived, is the only source of this organism that we have found. Samples of seawater from 30 fathoms' depth were also taken and analyzed. This water was found to contain bacteria but no greenish-yellow organism.

Besides the fish that were caught for us by Captain Hendricksen, we have also to thank Capt. N. Pedersen, of the halibut boat "Morricet," to whom we gave sterilized swabs, with instructions how to use them, and who brought back to Prince Rupert swabs he made in the Hecate Strait or Dixon Entrance. These were cultured and examined as described, and in no instance was the greenish-yellow organism found. Other bacteria, similar to those we found on fish caught by the "Gibson," were obtained.

This, then, constitutes final proof that absolutely fresh halibut does not have on its undersurface the fluorescent greenish-yellow organism. The whole of the trouble, therefore, must be attributed to infected ice.



Halibut photographed between two men of ordinary stature

A number of examinations were carried out to study the penetration of organisms from the slime to the skin, through the skin and into the underlying flesh. These investigations showed that after a certain length of time the bacteria grow through the slime and onto the skin, and that those organisms that have a digesting action seem to penetrate through the skin and infect the flesh. Some of the organisms able to do this were of the greenish-yellow type already mentioned; others were protein-digesting organisms that gave a white growth on the halibut medium and which were found to be present in considerable numbers on the fresh halibut. All these bacteria have an important bearing on the keeping quality of the fish, even when it is kept in contact with ice, for experiments have shown that many of these organisms can grow at very low temperatures—between 34 deg. and 38 deg. F.

Slime

Fishermen are of the opinion that slime has an important bearing on the keeping quality of the fish, a belief which is justified to the extent that a definite interval of time is required for the organisms to grow through the slime before they can attack the underlying skin. To this extent the action of the greenish-yellow bacteria and other organisms is delayed. Where the slime is washed away, or does not form after the death of the fish, bad cases of yellowing and quicker decomposition set in, evidenced as a rule by softening of the fish.

Knowing that the ice made from upland surface waters constitutes the principal source of the fluorescent organism, is it possible to prevent this discoloration? Is it possible to destroy the organisms in the water and thus obtain a pure ice supply? Undoubtedly this can be done, but each refrigerating plant using such water will need, first, a filtration plant to filter out the vegetable debris, and second, a chlorination apparatus with which to kill the organisms.

Both are necessary, because when chlorine is used in a water containing much organic matter it loses much of its disinfecting power, with the result that the organisms that one wishes to destroy escape death. The effectiveness of this method of killing the organism is shown by an experiment made in the laboratory. A gallon of water was inoculated with the fluorescent bacillus to the extent that each drop contained about 1,000 of these organisms. Chlorine was then added at the rate of three parts per million. Ten minutes later the water was again analyzed, and not a single greenish-yellow organism was found alive. If, however, the water had contained an appreciable amount of vegetable matter, such as that pumped out of the refrigerating tanks, this amount of chlorine would have been inert, and the organisms would not have been killed. Hence the necessity of filtration and either chlorination or some other effective method of destroying these organisms.

A practical and economical plant for the purpose would consist of a wash pressure filter, with a pressure coagulating tank. This filter could be located at a convenient point in the ice plant and the discharge line from it carried to a filtered water storage tank placed at such an elevation as to give sufficient head to deliver the water to the freezing cans. The discharge to the tank would be controlled by a gate valve to regulate the amount of flow. This water, as it goes to the storage tank, should be chlorinated by a chlorinator with a bubbling meter, having a feeding capacity of from 0.05 to 1.2 lb. of chlorine in 24 hours.

The solution from the chlorinator would be fed to the water as it is discharged from the float valve and at this point controlled by a float valve to shut off when there is no water running into the tank, and to bypass the chlorine solution into a line.

An ice plant provided with filter and chlorinator in this way would give a sterile water—a water free from organic matter and all matters in suspension, and practically free from color. To get a clear cake of ice it would, however, be necessary to draw the water from the core of the cake and refill it previous to the last freezing. Obviously there is difficulty in obtaining a clear cake of ice free from a brown core, but with the foregoing system and careful operation the colored core can be eliminated.

Fishermen, too, must recognize that the holds of their boats, bin boards, and the like, that have been washed and scrubbed with fresh water from the shore houses, will be infected by the greenish-yellow organisms; but only so far as these parts come in contact with fish will the latter be contaminated. At least 95 per cent of the infection will be eliminated by the use of filtered and chlorinated ice.

Fresh sea water would be better for washing purposes, provided it came from uncontaminated sources. Sea water pumped from near shore, where there would be likelihood of sewage or offal contamination, should not be used; neither should sea water near the effluent of rivers or streams.

European Fishing Methods

A move in the right direction has already begun in Europe. Reference has been made to the scarcity of halibut in the North Sea, and the necessity of fishing vessels going to more northern waters—frequently as far as Greenland—in order to obtain a cargo of fish. One firm has outfitted a storage boat of large capacity with the latest freezing and cold storage equipment. This firm operates in the Greenland waters, taking with it from Hull a fleet of 30 to 40 small motor-boats, manned by crews for line fishing. Halibut caught by these boats is handed over to the parent boat, where it is immersed in freezing brine and then placed in one of the cold-storage rooms until return to port. This method of brine freezing prevents the formation of tiny ice crystals among the fibers of the fish and leaves it in an absolutely natural condition. Thus it may be kept in cold storage for six months or longer, after which it can be thawed out and put on the market in competition with fish that has never been frozen. Halibut treated in this way is sold in many markets and with compete satisfaction.

Halibut boat fully equipped, including arrangement at the stern for dropping skates of gear

Economical Disposal of Factory Waste

By E. H. HARRY

Superintendent, Gibson Canning Company, Gibson City, Illinois

FOOD manufacturers who produce large amounts of organic wastes are facing increasing pressure from Conservation Commissions that will require individual plants to provide their own sewage disposal systems. We present here a successful plant, designed by E. H. Harry, which has been in operation two years.

A particularly ingenious feature is the use of reversing switches on the motor-driven pumps that permits unwinding corn-silk and other trash from the runners of the pumps without the trouble of opening the pump casings.

THE Gibson Canning Company produces liquid waste at the maximum rate of about 24,000 gal. per hour or 576,000 gal. per 24-hour day, which is equivalent to the sewage output of a city of 3,100 inhabitants, figuring 185 gal. per person per day as the normal production of domestic sewage. With a population of 2,000, if municipal sewers were to be adequate to care for the entire liquid waste of the city, both domestic and industrial, the sewage disposal system should be roughly the equivalent of that required by a city of 5,000 or 6,000 inhabitants. A system of this size does not exist, and the factory must take care of its own needs.

The problem of disposal of the factory waste has been solved satisfactorily and economically, however, but it has not been simple, because of the flatness of the surrounding country and the lack of streams with a flow adequate to depend on dilution as a means of avoiding nuisance. The factory produces three kinds of waste: sanitary sewage, which is discharged into the municipal sewers; cooling water, which carries no organic matter; and wash water, which is heavily loaded with organic matter, suspended and dissolved. More than one-half of the hourly maximum production of liquid waste is cooling water and, as it is pure water, may be discharged into any convenient natural water course without treatment.

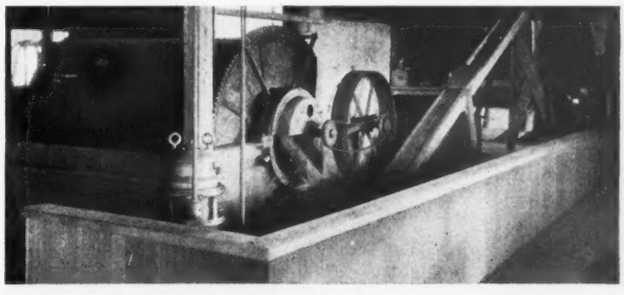
Approximately 9,000 gal. per hour may be regarded as the maximum rate of production of waste requiring treatment by screening, followed by intermittent oxidizing filtration. The screening removes all the suspended matter except the smallest particles, leaving only the dissolved solids, which will require further treatment before disposal into a small nearby creek, if nuisances are to be avoided. With plenty of land available, about 1,400 ft. from the factory, the intermittent oxidizing filtration system seemed to be the simplest method of oxidizing the organic matter, and preferable to employing the other possible methods involving digestion, chemical precipitation, and the like, the use of which might have been necessary with other types of waste or under other conditions.

The sewage screen is situated centrally in the factory so that the flow of water containing suspended matter will be as short as possible—a feature desirable because of the level condition of the country. Long sewer tiles cannot be given the steep pitch necessary to carry a large quantity of solids in suspension, at a velocity that will insure freedom from deposits of matter that may obstruct the flow.

From Fig. 1 it will be seen that the plan has been to build two cisterns, roughly 10 ft. deep, which are so arranged that, in case of trouble the screening plant can be by-passed. Between the two cisterns is placed a Green Bay screen. Liquid collecting in the unscreened sewage cistern is pumped into the screen, filtered, and falls into the second cistern. From the latter it is pumped to the filter beds.

The question is frequently asked as to why cisterns are used, and why the liquid is not pumped directly to the filter beds without the intervening accumulation in the cisterns. The reason behind this choice is that the absence of a reservoir would require pumps big enough to handle momentary flows that might be unusually large. Careful calculations showed that a pumping capacity of 200 gal. per minute would be sufficient to handle the waste from the first cistern to the screens, and that a capacity of 225 gal. per minute would be ample to remove the screened effluent. By having the second pump with a capacity larger than the first, the possibility of the first pump flooding the second cistern was avoided.

The first pump, with its low-head discharge pressure requires only a 2-hp. motor. The second pump, however, required more thought with reference to power specifications. The discharge outlet was 3 in. diameter; and, if a pipe line of this size running the 1,400-ft. dis-



Passing the liquid waste through a revolving screen removes most of the suspended solids and dumps them on the elevating conveyor at the right

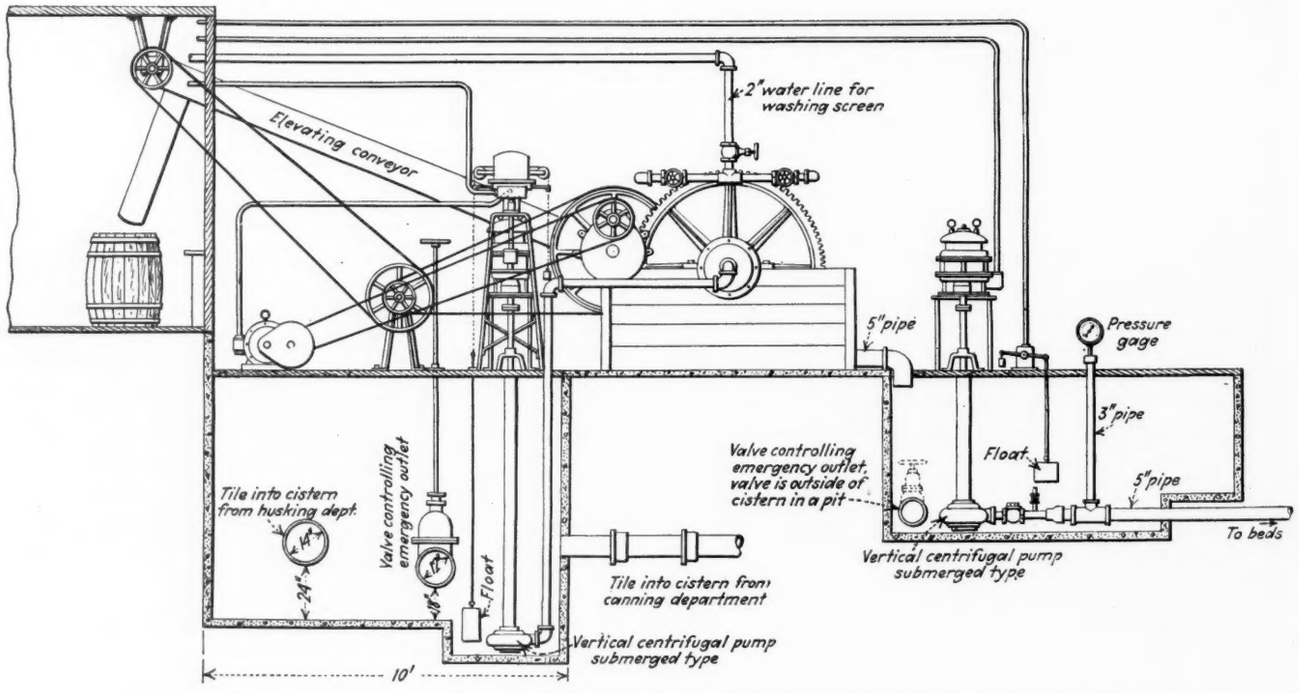


Fig. 1 — Elevation of the screening and liquid waste handling plant, showing method of operating the float-switches and driving the screen.

tance to the filter beds had been employed, the friction head losses would have been 16 ft. per 100 ft. However, by increasing the size of pipe to 5 in. the friction losses become only 1.33 ft. per 100 ft. This gave a total head loss, due to friction, of about 18.33 ft. and to it was added the 25-ft. static head against which the sewage must be pumped. With allowances for elbows and fittings the total losses were calculated at 56 ft. of head, which indicated the use of a motor of 3.18 hp. As there are no sizes between 3 and 5 hp., the latter was selected, giving a large margin of safety.

If a 3-in. discharge pipe had been used instead of a 5-in. pipe, calculations show that a motor of over 14 hp. would have been required. The difference of power requirements would have been due entirely to pipe friction.

Float-operated switches are installed that control the pumps and screen by operating them intermittently. The sewage accumulates until the first cistern is about half full, when the float closes the switches that start both the pump and the rotary screen. The pumps, of the open-impeller, vertical, submerged, centrifugal type, are in sumps at the bottoms of the cisterns. The second pump operates entirely independently of the first.

The screen proper is 50-mesh copper screen; but, if it is necessary to replace it, a 40-mesh screen will be used. Rubbish, corn silks and cobs, husks and corn kernels, automatically removed, are dumped into an elevating conveyor that deposits them in a barrel to be hauled away and dumped. A 1½-hp. motor operates the screen.

The screen effluent falls into the second cistern until it, too, is about half full, when the float switch starts the 5-hp. motor and forces the waste out to the filter beds a quarter mile away.

To prevent clogging of the runner of the first pump with corn silk and shreds, the motor is provided with a hand-operated reverse switch, so that by running the pump backwards the material may be easily unwound from the impeller. Usually a single reversal per day, lasting no longer than two minutes, is enough to clean the pump.

In the 3-in. discharge line from the second pump, before it is increased to 5-in. size, is a check valve, placed there to prevent all the liquid in 1,400 ft. of 5-in. pipe from draining back into the cistern every time the pump stops, because this would necessitate repumping many times daily. For winter use, however, to prevent freezing of the line, a small outlet valve is tapped into the line just beyond the check. During freezing weather it is left open at all times and partly drains the line between pumping intervals. By thus drawing the liquid below the surface of the ground at the outlets at the sewage filter beds the possibility of freezing is avoided. At night and on holidays the pipe will be completely drained by this small outlet. The slight loss of work involved is accepted as preferable to frozen pipes.

A corner of one of the four filter beds receiving its dosage of screened waste. Weeds grow prolifically in the late summer.

Filter Beds

Four filter beds of roughly one-quarter acre each are sufficient to take care of all the sewage. These beds are made by simply leveling off the ground and building a bank about 1 ft. high around the four sides. Screened sewage is discharged onto each bed for a day, after which it is allowed to stand for three days, and by the

fifth day it is ready to receive its quota of sewage again. No tile underdrains are used. The natural character of the soil is such that the seepage into the ground, and thence presumably into the nearby creek, is adequate to handle all the liquid.

During occasional slack periods the bottoms of the beds are plowed up to expose a greater surface to the

Back of the revolving screen is its driving mechanism as well as the driving head and float-switch of one of the pumps

air. At no time has the water ever stood on the bed to form a lake. Each dosage runs part way across the bed and disappears. Weeds grow actively in the beds during the late summer months.

Stream pollution has been avoided and no nuisance has developed. The matter of screening the waste is important to avoid plastering the ground in the beds with solids.

Such cost figures as are available are: Screen, $1,235.95; first pumps, $390; second pumps, $410; land for filter beds, per acre, $400; 5-in. pipe, second hand—half of price of new.

Olive Oil Production for 1928-29 Expected to Be Small

PRODUCTION of olive oil in the Mediterranean Basin for the 1928-29 season is expected to be considerably below that of 1927-28 and possibly lower than the 1921-1925 average, according to official trade statistics received in the foreign service of the Bureau of Agricultural Economics. The Mediterranean output this season is estimated at little more than 1,224 million pounds, compared with a 1927 production of 2,107 million pounds, and 1,281 million pounds in 1926. The shortage is due to the decrease in the crops of Spain and Portugal following the large production in these countries in 1927. A slight decrease is also expected in the output of France, but most other countries report good conditions and probable increases in production. The crop of Spain is such an important factor in the world olive oil production, however, that the increases reported elsewhere cannot compensate for the decrease in that country.

Estimates contained in the report of the Federation of Co-operative Oil Producers in the south of France and those so far received from the International Institute of Agriculture are given in the following table:

Estimates of Production in Specified Countries, 1927 and 1928

County	Federation of Co-operative Oil Producers, France		International Institute of Agriculture	
	1927	1928	1927	1928
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.
Spain	1,501,000	375,000	1,467,500	407,900
Portugal			.....	.....
Italy	297,000	353,000	317,900	472,000
France	20,000	18,000	18,700	17,600
Greece			159,600 (a)	231,500
Syria	178,000	353,000	.....	.....
Lebanon			4,700	3,500
Turkey			.....	.....
North Africa, total	111,000	126,000	.....	.....
Algeria	.....	.....	10,600 (a)	12,100 (b)
Tunis	.....	.....	35,300	99,200
Total Mediterranean Basin	2,107,000	1,225,000	.....	.....

(a), Official Governmant figure. (b), Algiers and Oran.

For some time it has been felt in Italy that a serious menace to the olive oil trade of that country has been constituted by Article 72 of the regulation for the execution of the royal decree of Oct. 15, 1925, which includes refined sulphur oils under the name of oils of *second working* and which permits the mixture of them with genuine olive oil. Opinion was that a clear distinction should be made between refined oils manufactured from fallen olives and oils made from the husks and extracted by solvents, which cannot be considered as olive oils either in composition or characteristics, but must be classed as seed oils.

To this end the Council of Economy of Brindisi, in collaboration with the councils of Bari, Lecce, and Taranto, formulated a vote to the government looking toward the prohibition of the sale of olive oil mixed with seed oil.

This recommendation limits itself to seed oils, but it is implied that refined sulphur oils, being different from olive oil in origin and composition, are included in the recommendation itself.

According to the National Society of Olive Growers at Rome, it has been demonstrated that seed oils not only have nutritive and assimilative qualities inferior to those of olive oil, but certain of them, if not sufficiently purified, may prove actually poisonous.

Attention is called by the Italians to the fact that on Feb. 1, 1928, a decree went into effect prohibiting to producers and merchants the mixture of olive oil with seed oils and artificial oils of any kind. The olive oil must be presented to the trade absolutely pure.

Yields of Canned Corn per Ton

A WIDE RANGE exists in the number of cases of corn from a ton of raw stock obtained by different canners, according to S. H. Devault, of the Department of Agricultural Economics, University of Maryland, in an address before the Corn Section of the National Canners Association at the 1929 convention. The following figures represent records covering three years.

Yield per Ton of Raw Stock, 1925, 1926 and 1927

Year	Number of Reports	Yield in Cases of 24 No. 2 Cans per Ton		
		Low	High	Average
1925	15	25.0	40.8	30.0
1926	20	25.0	33.0	28.5
1927	6	24.0	35.0	29.3
Average		24.7	36.3	29.3

A part of this variation is due to the differences in condition of raw material at different factories, while a part of it is due to differences in methods of reducing waste.

A large dried fruit plant with a capacity of more than two million pounds a day, where science has reduced costs at the same time standardizing quality

Processing and Packaging California Raisins Is Chiefly Automatic

By P. D. V. MANNING
Assistant Editor, Food Industries

ONE of the most significant events in the American food industry during the last two decades is the phenomenal growth of California's raisin production. Less than sixty years ago cattle roamed the lands in California that now yield over half the world's supply of raisins. A few vines planted by the Spanish padres in the gardens of the missions have given rise to acreage producing 250,000 to 300,000 tons of raisins annually.

It is only within recent years that raisin manufacturing technique has been developed. Formerly, raisins were packed in boxes by the simple, slow, laborious, hand method. Little or no attempt was made to segregate grades and sizes. Today, raisin manufacturing is a highly technical operation—a synchronized motion of machinery for sorting, grading, processing, and automatically packing specialty products with speed and the exactness characteristic of mechanized production.

A freight yard from which dried fruits start on their journey to every part of the civilized world.

The pioneering of the manufacturing field has been vested in the Sun-Maid Raisin Growers Association as the leader in the industry. This association has originated practically all of the important specialty products so widely known today.

Considerable energy has necessarily been devoted to research. Exhaustive study and countless tests were required to perfect "the seeded raisin that isn't sticky," popularly called "puffed." This is equally true of the experimentation in connection with another familiar product termed "nectars," seedless raisins with the natural fragrance of the grape. Manufacturing research has been solicited to develop products for specialized outlets. A closely calipered grade of plump, juicy fruit for confectioners and a type for bakery use are typical creations. As a consequence of

the policy of maintaining quality by converting off-grade fruit, research has had to exploit the byproduct field: for example, it was necessary to devise means of "denaturing" raisins used in stock feed, so as to prevent their reconditioning for use in food outlets.

Standardization

An integral part of the association's manufacturing program has been the promulgation and rigid enforcement of standards. Requirements of the product as to size, color, plumpness, meatiness, pliability, sugar content, and moisture are set forth in minute detail. Each piece of packing material used is enumerated, and the manner in which it is assembled in the final package is specified. Standardization and simplification have been applied to every mechanical step, thus assuring uniformity of quality and pack, systemized procedure, stabilized control, and economical operation.

A salient feature of the set-up is the provision for a continuous flow of the product during manufacturing. This is an important factor in cleanliness and in the preservation of the quality and uniformity of the fruit. Further, it aids automatic packaging in cartons and cases.

Automatic packaging, though confronted with obstacles by reason of the nature of the product, has been mastered, and it constitutes the final link in the association's all-mechanical arrangement. In the Fresno plant alone, 36 automatics, each with a capacity of 45 15-oz. cartons per minute, six each packing 70 five-cent cartons a minute and three each handling over twelve 25-lb. bulk cases a minute are utilized in caring for a large volume of business. It is illustrative of vigilance as to sanitary packing conditions and of precautions in securing exactness of weight.

As far as possible, the association's manufacturing activities are centralized in its huge million-dollar plant at Fresno, which is equipped to manufacture over 1,000 tons daily. Auxiliary plants are maintained, however, to supplement and clip off the peak loads as they occur and to afford adequate facilities for receiving the crop from the growers. Adequate flexibility meets the maximum seasonal demands.

Except for a nominal surge of some of the major packs, only those goods which have actually been sold are manufactured into finished form. This assures the trade of delivery of freshly processed merchandise.

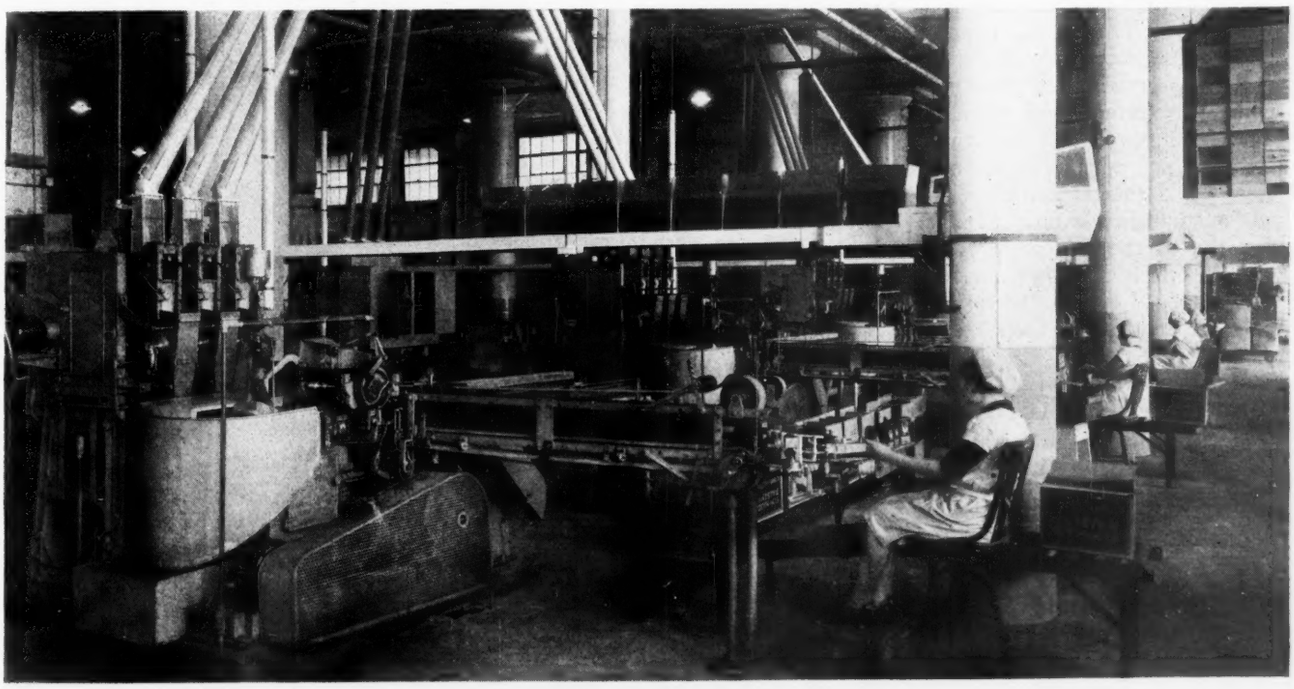
Raisin Grapes

In the making of raisins the raw product is the sun-dried grape. Fertile soil, adequate ground moisture and long summers, with abundant sunshine and warmth, are indispensable to the growth of raisin grapes. A harmonious combination of these essentials is prerequisite to filling the berries with pleasing flavors, aromas, and natural sugars. Cool, dry weather in autumn is necessary for drying the grapes.

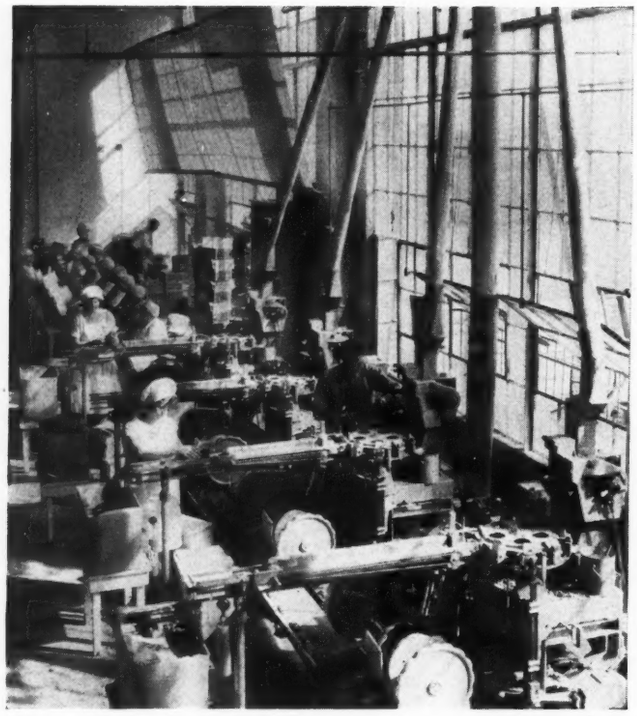
As a consequence of these extraordinary requirements, raisins in the United States are produced almost exclusively in the San Joaquin Valley in California. Though many varieties of grapes are grown, a few possess the qualities for drying. Present production is practically limited to three varieties—muscats, with seeds (usually distributed in seeded form); Thompson seedless, grown without seeds; and sultanas, similar to the latter but having a more intense sub-acid flavor.

Cultural activities demand careful supervision. Such operations as plowing, cultivation, irrigation and pruning of the vines necessitate close attention of the growers. Invaluable assistance in these matters is rendered by county farm advisers, horticultural commissioners, and state and university authorities.

Great care is taken to see that raisin grapes are harvested in full maturity. They are picked by hand and placed on trays for exposure to the sun's rays. After a brief drying period, the grapes are turned over, so that evaporation will be uniform. Later, the trays are stacked so as to shade the grapes, in order that they will dry slowly and produce tender, juicy raisins. Finally, the



Automatic machinery minimizes the uncertainties and expense of hand labor in packing millions of dried fruit cartons. These machines are capable of 45 packages per minute.



Seventy-five small packages per minute come from each of these automatic weighting and packing machines, thus contributing to minimum costs for the finished product.

raisins are boxed so as to equalize the moisture content. They are delivered to the packing houses, where they are classified as to quality.

Manufacturing Processes

The initial manufacturing step is the separation of the berries and the main stems by friction. This is accomplished by wedging the raisins between a rotating and stationary screen. Subsequently, a strong blast of air removes the stems, chaff, and immature and light berries.

The fruit is then run over screens for segregation as to size in accordance with the association's standards.

Seedless raisins are then passed to a machine with a cylindrical screen and paddles, known as a recleaner. The fruit is given a vigorous cleansing, and the short stem, known as the "capstem," is severed from the berries. The raisins are then screened, and the midgets, as the small berries are called, are passed between rollers for the ejection of hard or immature fruit. If after careful inspection they conform to requirements, they are conveyed to the "nectar" processing unit, or, in the case of natural seedless, to the battery of automatic packing machines.

Raisins for "nectars" are subjected to a highly unique patent process used exclusively by the association. Under scientific control the fruit is pasteurized; the natural flavor and fragrance of the fresh grape are imparted; and the raisin is specially prepared so as to retain its tenderness and juiciness.

Puffed Raisins

Though a small tonnage of muscats is packed "loose," that is, without further processing, the major portion is distributed in seeded form. As an aid to separating the seeds and the berries, and removing the capstems, the raisins are conveyed through a huge drier. An added advantage of this treatment is equalization of the moisture content. The raisins then descend through a conical recleaner and the capstems are driven away by a blast of air. All immature berries are floated from the small grade referred to in the trade as "1-Crown." The dried raisins move on endless belts to the seeding units. Here they are seeded and processed into final form. Two systems of processing are in vogue—"puffed," and the so-called old-style methods. The former, regarded as an achievement in raisin manufacturing, has practically supplanted the old-style seeded raisin. Both product and the process of its manufacture are patented. Briefly, the process pasteurizes the product, retains the juice, and produces raisins that are plumper and richer in flavor and free from the stickiness characteristic of ordinary seeded raisins. The raisins then flow to the automatics for packing.

Prior to packaging, the product is again inspected, thus checking the manufacturing performance. Packing is automatic and non-manual to a high degree. For housewife distribution, the fruit is packed in cartons and bags, and for other outlets in wood and fiber cases, barrels, and cans. Cartons and bags are so well sealed that external contamination is almost impossible. They are assembled in cases that are lidded or sealed by automatic operation. Paper liners protect the bulk containers, which are likewise lidded and sealed. The cases pass on gravity conveyors to the freight cars or to the shipping floor for concentration with other goods. As a safeguard, the cars are thoroughly fumigated. The total time consumed from the initial manufacturing step to the delivery of the finished product in the car is only a matter of seven minutes.

A tour through the raisin belt and an inspection of the Fresno plant impresses one with the magnitude of the industry. The highly developed processes, the extreme cleanliness in operation, fruitful research, standardization, continuous flow of the product, automatic packaging, and large scale performance contribute to the significance of raisins in food manufacturing.

Secretary of Agriculture Jardine inspecting an evidence of "scientific farm relief"—an improved seeded raisin that isn't sticky.

Food Manufacturing Statistics from the Census of Manufactures for 1927

THE biennial federal census of manufactures is always of interest to the food industry if for no other reason than the justifiable pride felt in heading the list of sixteen groups of establishments into which the industrial activity of the United States is allocated by the department statisticians at Washington. In the table on page 304 of this issue of FOOD INDUSTRIES is given the relative standing of all industries together with a few of the more significant census items.

In 1927 manufactured food and kindred products accounted for 17 per cent of the total 62¾ billion dollars' value at the door of the factory; textiles and their products represented 14.3 per cent; chemicals and allied products, 10.2 per cent; iron and steel and their products (excluding machinery) 9.9 per cent; and machinery, other than transportation equipment, 8.5 per cent. These six groups constitute about three-fifths of all manufactures.

The census as a whole indicates a slight increase in output per worker and in average wage, the latter being demonstrated by an increase in total wage payments accompanied by a decline in the number of wage earners. Industrial census reports fail to indicate the present means of livelihood of former factory workers, but it should by no means be assumed that they have joined the ranks of the unemployed. Building operations of various sorts and other non-manufacturing activities undoubtedly provide employment for many that are no longer needed by the factory.

The average production of the 191,863 establishments reporting to the government was approximately $306,000. In the food industry the corresponding average was $221,000, having increased from $216,000 in 1925. This relatively small output per plant is not surprising in view of the far-flung distribution of food factories and the modest demands of capital investment involved as compared, for example, with those plants in which iron and steel are made or fabricated.

Although the trend of all industry is in the direction of constantly fewer establishments and increasing output, the year 1927 proved an exception to the extent that there were 2.5 per cent more establishments than there were in 1925, with a 4 per cent increase shown in the field of food manufacture.

In the accompanying material, Table 1 gives the latest available general statistics for approximately thirty groups of commodities that make up the industry terms Food and Kindred Products. Data are included for number of establishments, number of wage earners, wages paid (excluding salaries), horsepower installed, and the value added by manufacture. For comparative purposes figures are given for both 1925 and 1927. In some cases transfers of minor commodities have been made from one group to another since 1925. For this reason strictly comparable figures are not always available.

In Table 2 are summarized for the two census years the quantities of commodities produced and the values thereof. Here again, because of changes in classification comparisons are often impossible, data for the earlier period not being included unless they are on a substantially equivalent basis of classification. This accounts for the many gaps in the figures given for 1925.

The data in Table 1 should not be compared with the data in Table 2. In the first table are given general statistics for those companies whose principal business has to do with the commodity named. In the second table are given production and value figures for commodities whether produced within this major industry itself or as incidental products of another industry. This fact should be borne in mind clearly and no effort made to establish ratios between statistics occurring in Table 1 and those occurring in Table 2, inasmuch as such ratios might be so much in error as to be misleading.

TABLE I—MAJOR COMMODITY GROUPS OF THE FOOD INDUSTRIES

Census of Manufactures for 1927 and 1925 Show Comparative Data of the Various Divisions of Food Manufacturing and Processing

Industry	Establishments (Number)		Wage Earners (Number)		Wages (Millions of Dollars)		Horsepower (Thousands)		Value Added By Manufacture (Millions of Dollars)	
	1925	1927	1925	1927	1925	1927	1925	1927	1925	1927
Beverages	4,210	4,756	27,384	26,974	36	36	169	154	139	147
Bread and bakery products	17,684	18,129	160,411	171,995	220	236	227	284	600	685
Butter, cheese, condensed milk	6,830	6,721	28,274	31,006	35	40	202	231	126	160
Canned fruit and vegetables	2,403	2,436	85,866	80,562	67	62	187	190	230	217
Canned fish	319	337	10,530	12,650	7	8	20	19	22	22
Cereal preparations	90	77	6,168	6,028	8	8	53	51	58	64
Chewing gum	41	39	2,180	2,504	3	3	8	10	30	35
Chocolate and cocoa	60	69	7,128	6,427	8	7	58	63	33	32
Coffee and spices	.....	784	.....	8,195	..	10	....	43	....	99
Confectionery	1,931	1,908	63,600	63,163	55	57	100	111	174	174
Corn sirup, oil, and starch	30	24	6,492	6,911	9	10	73	81	40	44
Feeds, Prepared	275	447	4,545	7,632	5	10	68	116	29	55
Flavoring extracts	431	501	3,890	5,011	5	7	23	28	47	56
Flour and grain products	4,413	4,035	31,988	29,982	40	38	670	642	173	176
Foods, Miscellaneous	694	674	11,562	10,294	11	11	33	35	66	69
Ice cream	2,790	2,976	23,043	21,912	33	33	189	206	145	151
Ice	3,077	3,159	24,915	22,120	35	33	923	965	142	144
Lard substitutes	26	33	1,962	2,655	2	3	25	33	11	11
Macaroni, etc.	327	353	4,560	4,587	5	5	20	21	16	18
Malt	23	23	568	499	0.9	0.9	15	15	4	3
Nuts, Processed	69	144	1,990	7,345	1	3	9	14	2	10
Oleomargarin, etc.	38	36	1,639	1,502	2	2	7	9	11	12
Rice, Cleaned	63	60	1,296	1,524	1	2	22	23	8	8
Sausage	489	505	4,914	4,967	8	7	18	20	21	21
Sugar, Beet	89	79	8,872	7,402	12	10	147	142	45	26
Sugar, Cane	94	53	2,066	971	0.6	1	73	46	2	2
Sugar, Cane, refined	21	21	14,502	13,996	19	18	89	87	57	46
Slaughter house and meat products	1,269	1,250	120,422	119,095	159	162	442	490	425	393
Vinegar and cider	161	158	1,243	1,117	1	1	7	8	5	5
Totals (including items not listed)	47,947	49,787	662,010	679,520	791	823	3,876	4,235	2,663	2,885

TABLE II—PRODUCTION AND VALUE FIGURES FOR FOOD AND KINDRED PRODUCTS

Commodity	Quantity Produced 1925	Quantity Produced 1927	Quantity Produced Increase (+) or Decrease (—) (Per Cent)	Value of Products 1925 Millions of Dollars	Value of Products 1927 Millions of Dollars	Value of Products Increase (+) or Decrease (—) (Per Cent)
Beverages	.....	.....	.....	243.00	242.00	.....
Carbonated	.....	.....	.....	168.00	178.00	+ 5.9
Cereal	.....	.....	.....	60.00	48.00	— 19.8
Still beverages	.....	.....	.....	6.50	5.40	+ 62.8
Grape	.....	.....	.....		5.20	
Miscellaneous	.....	.....	.....	9.00	6.40	— 29.6
Bread and other bakery products	.....	.....	.....	(a)	1,236.00	.....
Bread, rolls, and coffee cake (million lb.)	.....	8,769.0	.....	.....	693.00	.....
Biscuit, crackers, etc. (million lb.)	.....	1,256.0	.....	.....	243.00	.....
Soft cake, pastry, pound cake, etc.	.....	.....	.....	.....	227.00	.....
Pies	.....	.....	.....	.....	60.00	.....
Pretzels (million lb.)	.....	40.0	.....	.....	7.00	.....
Miscellaneous	.....	.....	.....	.....	5.60	.....
Canned and processed fruits, vegetables, etc.	.....	.....	.....	607.00	553.00	— 8.9
Canned veg. and soup (million cases)	115.0	97.0	— 15.2	283.00	234.00	— 17.1
Canned fruit (million cases)	26.0	28.0	+ 6.0	103.00	102.00	— 1.0
Dried fruit (million lb.)	1,054.0	1,013.0	— 4.1	72.00	64.00	— 11.1
Dried vegetables (million lb.)	1.3	0.2	— 84.0	0.20	0.10	— 57.0
Pickles, sauces, etc.	.....	.....	.....	109.00	115.00	+ 5.2
Jelly, jam, preserves	.....	.....	.....	40.00	38.00	— 5.3
Canned fish and products	.....	.....	.....	58.00	64.00	+ 10.3
Cereal preparations	.....	.....	.....	(a)	160.00	.....
Breakfast foods	.....	.....	.....	.....	112.00	.....
From wheat (million lb.)	.....	.....	.....	.....	42.00	.....
From oats (million lb.)	.....	844.0	.....	.....	40.00	.....
From corn (million lb.)	.....	293.0	.....	.....	22.00	.....
From others or mixed (million lb.)	.....	42.0	.....	.....	8.60	.....
Prepared flour (million lb.)	.....	880.0	.....	.....	38.00	.....
Coffee substitutes (million lb.)	.....	29.0	.....	.....	6.20	.....
Other cereal prep.	.....	.....	.....	.....	3.00	.....
Chewing gum	.....	.....	.....	54.00	58.00	(a)
Related products	.....	.....	.....	0.70	3.70	.....
Chocolate and cocoa products	.....	.....	.....	107.00	123.00	+ 15.1
Chocolate, except coating (million lb.)	138.0	153.0	+ 10.5	43.00	46.00	+ 7.8
Unsweetened (million lb.)	12.0	11.0	— 10.8	3.50	3.00	— 13.6
Sweet, plain (million lb.)	15.0	21.0	+ 35.4	4.30	5.10	+ 18.2
Sweet, with nuts, etc. (million lb.)	1.5	3.1	+ 99.0	0.40	0.80	+110.7
Milk, plain (million lb.)	64.0	65.0	+ 1.3	19.00	19.40	+ 3.2
Milk, with nuts (million lb.)	46.0	54.0	+ 17.7	16.00	18.00	+ 13.0
Chocolate coatings (million lb.)	236.0	235.0	— 0.4	43.00	49.00	+ 14.3
Sweet (million lb.)	144.0	147.0	+ 1.9	25.00	29.00	+ 17.6
Milk (million lb.)	63.2	63.0	— 0.4	13.00	14.00	+ 6.5
Liquor (million lb.)	29.0	26.0	— 11.8	5.00	6.00	+ 18.1
Cocoa, powdered (million lb.)	85.0	91.0	+ 6.6	11.00	14.00	+ 24.7
Cocoa butter (million lb.)	25.0	23.0	— 10.0	7.00	8.50	+ 25.8
Other chocolate products (million lb.)	.....	.....	.....	3.00	5.00	+ 68.3
Coffee and spices	.....	.....	.....	(b)	380.00	.....
Coffee roasted (million lb.)	.....	1,038.0	.....	.....	347.00	.....
Spices ground (million lb.)	.....	49.0	.....	.....	17.00	.....
Miscellaneous	.....	.....	.....	.....	16.00	.....
Confectionery	.....	.....	.....	(a)	371.00	.....
Chocolate, fancy pkgs (million lb.)	.....	132.0	.....	.....	69.00	.....
Chocolate, bulk (million lb.)	.....	190.0	.....	.....	48.00	.....
Chocolate count (million lb.)	.....	54.0	.....	.....	10.00	.....
Bars, chocolate covered (million lb.)	.....	272.0	.....	.....	58.00	.....
Bars, others (not incl. solid chocolate (million lb.)	.....	75.0	.....	.....	14.00	.....
Hard candy (million lb.)	.....	223.0	.....	.....	35.00	.....
Caramels and chewing candy (million lb.)	.....	102.0	.....	.....	16.00	.....
Gum work (million lb.)	.....	83.0	.....	.....	11.00	.....
Pan work (million lb.)	.....	73.0	.....	.....	10.00	.....
Marshmallows (million lb.)	.....	54.0	.....	.....	9.00	.....
Lozenges (million lb.)	.....	24.0	.....	.....	6.60	.....
Salted nuts (million lb.)	.....	.....	.....	.....	16.00	.....
All others (million lb.)	.....	.....	.....	.....	68.00	.....
Corn sirup, oil and starch	.....	.....	.....	133.00	134.00	+ 1.1
Corn sirup, unmixed (million lb.)		901.0			22.00	
Mixtures of corn and other sirups (million lb.)	1,145.0	223.0	— 1.8	41.00	10.00	— 21.2
Corn sugar (million lb.)	580.0	905.0	+ 55.9	20.00	26.00	+ 31.4
Corn oil, crude (million lb.)	102.0	61.0	+ 26.5	14.00	5.00	+ 14.7
Corn oil refined (million lb.)		68.0			11.00	
Corn starch (million lb.)	854.0	1,012.0	+ 18.5	34.00	32.00	— 4.2
Potato starch (million lb.)	10.0	7.0	— 30.1	0.40	0.38	— 6.3
Other starches (million lb.)	10.0	13.0	+ 32.4	0.80	1.00	+ 22.5
Cornoil, cake and meal (thousand tons)	33.0	24.0	— 29.3	1.30	0.80	— 39.5
Stock feed (thousand tons)	522.0	636.0	+ 21.9	18.00	19.00	+ 7.9
All others	.....	.....	.....	4.00	6.00	+ 63.0
Dairy Products						
Butter, cheese and condensed milk	.....	.....	.....	923.00	1,012.00	+ 9.7
Creamery butter (million lb.)	1,453.0	1,563.0	+ 7.6	636.00	695.00	+ 9.5
Whey butter (million lb.)	2.1	1.5	— 29.0	1.00	0.50	— 47.5

Corporation Statements

American Sugar Refining Co.—Earnings on 1928 operations of American Sugar Refining Company were $8,016,436, which, together with income from Cuba and other sources of $1,597,996, make a total income of $9,614,432. After provision for taxes, depreciation, interest and the regular 7 per cent dividend on the preferred stock, $3,418,625 was credited to surplus, equivalent to $7.60 a share on common, which compares with $1.49 a share in 1927.

There has been no payment on the common stock since January, 1928, due to inadequate earnings and the uncertainties of the sugar outlook because of governmental control in Cuba. Surplus now stands at $19,975,208, reserves at $13,284,986 and cash at $27,868,860.

Beech-Nut Packing Co.—The Beech-Nut Packing Company and controlled affiliated companies report for 1928 net profit of $2,768,768 after charges and Federal taxes, equal after 7 per cent preferred dividends to $6.51 a share on 425,000 common shares outstanding at the end of the year. This compares with $2,301,464 or $5.94 a share on 375,000 shares of common stock outstanding the greater part of 1927 and $5.24 a share on 425,000 common shares outstanding at the end of the year.

Borden Company.—The report of the Borden Company and subsidiaries for 1928 shows net income of $11,354,331, after depreciation, federal taxes and other charges, equal to $9.07 a share on 1,251,775 capital shares of $50 par value each. This compares with net income for 1927 of $7,154,445, or $10.32 a share on 693,414 shares then outstanding.

Gross sales for 1928 were $180,849,994, compared with $132,046,779 for 1927. Operating profit was $12,025,994, compared with $7,700,820. The consolidated balance sheet as of Dec. 31 shows total assets of $117,883,588, including cash of $13,546,196 and marketable securities of $10,243,642. Surplus amounted to $30,313,609.

Canada Dry Ginger Ale, Inc.—Canada Dry Ginger Ale, Inc., shows net sales for 1928 of $12,520,519, an increase of $2,916,547 over 1927, with the net of G. B. Seely's Son, Inc., included for seven months and that of Chelmsford Ginger Ale, Inc., for three months. The net profit for 1928, after depreciation, interest and Federal and Canadian income taxes, amounted to $3,103,294, a gain of $769,112 over 1927.

Corn Products Refining Company.—The report of the Corn Products Refining Company for 1928 shows net income of $13,192,974 after interest, depreciation, Federal taxes and other charges, equivalent after preferred dividends to $4.52 a share earned on 2,530,000 common shares. This compares with 1928 earnings of $11,905,289, or $4.01 a share.

Hershey Chocolate Corp.—The report of the Hershey Chocolate Corporation and affiliated companies for the final quarter of 1928 shows net income of $1,714,460 after expenses, Federal taxes and other charges, equal after dividend requirements on the 6 per cent preferred

stock and after allowing for participating provisions on the $4 preferred stock, to $1.72 a share on 650,000 no-par common shares. This compares with $1,538,126, or $1.35 a share on the common stock, in the previous quarter, and with $1,561,036, or $1.39 a share, in the quarter ended June 30, 1928. Net income for the full year 1928, as compiled from quarterly reports, totaled $6,456,387, equal after preferred dividend requirements to $6.05 a share on 650,000 common shares.

Kraft-Phenix. — Kraft-Phenix Cheese Corp. and wholly owned subsidiaries show net income for the year ended Dec. 31, 1928, of $1,848,258 after interest, federal taxes, subsidiary preferred dividends, etc., equivalent, after deducting one month's dividend requirements on $6,000,000 new 6½ per cent preferred stock, to $2.04 a share earned on 888,413 no-par shares of common stock issued or to be issued. This compares with the net income reported by Kraft-Phenix Cheese Company in 1927, of $1,189,865, equal to $2.62 a share (par $25) on 452,979 shares then outstanding.

No net income is included in the 1928 statement where ownership of subsidiaries is less than 100 per cent. Such equity amounts to an additional $300,000 after provision for income tax.

Pet Milk Company.—The Pet Milk Company and subsidiaries report for 1928 a net profit of $797,378 after all charges including taxes and prior charges, equal to $1.55 a share on 450,000 common shares outstanding.

Postum Company.—The annual report of the Postum Company, Inc., and its subsidiaries for 1928 shows a consolidated net income of $17,586,477, after all charges and federal taxes, equivalent to $3.75 a share on 4,682,736 shares. This includes profits prior to the date of acquisition of subsidiary companies acquired in the year. The earnings in 1927 amounted to $13,591,383, or $7.92 a share on 1,714,734 shares then outstanding.

Quaker Oats Company.—The statement of the Quaker Oats Company and subsidiaries as of Dec. 31, 1928, shows total assets of $61,566,399, compared with $57,644,508 at the end of 1927, and a surplus of $15,967,387 against $15,761,026. Current assets were $34,546,419 and current liabilities $6,197,556, contrasted with $31,719,132 and $6,067,762, respectively at the close of the preceding year.

Royal Baking Powder. — The Royal Baking Powder Company and subsidiaries report for 1928 a net profit of $1,265,203 after depreciation, Federal taxes and other charges, equivalent, after preferred dividends, to 83 cents a share earned on 800,000 no-par shares of common. This compares with $1,487,431, or $1.11 a share, in 1927, based on the present share status.

Penick & Ford, Ltd., Inc.—Penick & Ford, Ltd., Inc., and subsidiaries report for the year ended Dec. 31 net profit of $1,293,196 after depreciation, interest, Federal taxes and contingent reserve, equivalent, after dividend requirements on 7 per cent preferred stock, to $2.56 a share earned on 424,965 shares of no-par common stock. This compares with $1,076,388, or $2.04 a share in 1927.

TABLE II—PRODUCTION AND VALUE FIGURES FOR FOOD AND KINDRED PRODUCTS
(CONTINUED)

Commodity	Quantity Produced 1925	Quantity Produced 1927	Quantity Produced Increase (+) or Decrease (—) (Per Cent)	Value of Products 1925 Millions of Dollars	Value of Products 1927 Millions of Dollars	Value of Products Increase (+) or Decrease (—) (Per Cent)
Cheese, cottage, pot and bakers (million lb.)	51.0	69.0	+ 33.3	4.00	6.00	+ 37.8
Cheese (other)	495.0	449.0	— 9.2	108.00	104.00	— 3.9
Condensed milk, sweetened (million lb.)	431.0	379.0	— 12.1	39.00	34.00	— 11.6
Evaporated milk, unsweetened (million lb.)	1,288.0	1,606.0	+ 23.6	104.00	130.00	+ 25.0
Condensed and evap. buttermilk (million lb.)	95.0	113.0	+ 19.0	2.70	3.70	+ 38.2
Powdered milk and cream (million lb.)	89.0	132.0	+ 48.8	10.00	15.00	+ 46.7
Dried and powdered buttermilk (million lb.)	23.0	52.0	+126.2	1.40	4.30	+200.0
Sterlized milk, canned (million lb.)	6.4	7.8	+ 22.0	0.40	0.60	+ 59.0
Sugar of milk (million lb.)	6.1	5.4	— 11.8	0.90	0.60	— 27.6
Ice cream, ices and specialties (million gal.)	216.0	227.0	+ 4.9	268.00	283.00	+ 5.4
Ice cream and ices (million gal.)	213.0	223.0	+ 4.5	263.00	275.00	+ 4.6
Specialties (million gal.)	3.0	4.0	+ 34.4	5.00	7.00	+ 47.2
Others	.....	.....	.....	18.00	19.00	+ 4.8
Ice cream mix and stock (million lb.)	113.0	114.0	+ 1.0	12.00	14.00	+ 11.4
Dried casein (million lb.)	22.0	24.0	+ 7.2	2.30	3.00	+ 32.6
Flavoring extracts, flavoring sirups and related products	.....	.....	.....	(a)	116.00	.....
Flavoring extracts and flavoring sirups	.....	.....	.....	.....	68.00	.....
Flavoring extracts	.....	.....	.....	.....	22.00	.....
Flavoring sirups	.....	.....	.....	.....	37.00	.....
Not specified	.....	.....	.....	.....	9.00	.....
Concentrates	.....	.....	.....	.....	4.40	.....
Malt sirups and extracts	.....	.....	.....	.....	30.00	.....
Crushed fruits	.....	.....	.....	.....	6.00	.....
Fruit juices	.....	.....	.....	.....	2.00	.....
Flavoring pastes	.....	.....	.....	.....	0.30	.....
Flavoring powders	.....	.....	.....	.....	2.00	.....
Cordials	.....	.....	.....	.....	0.60	.....
Colors	.....	.....	.....	.....	2.00	.....
Burnt sugar	.....	.....	.....	.....	0.90	.....
Powder	.....	.....	.....	.....	0.50	.....
Liquid	.....	.....	.....	.....	0.40	.....
Paste	.....	.....	.....	.....	0.10	.....
Not specified	.....	.....	.....	.....	0.07	.....
Not reported by kind	.....	.....	.....	.....	1.00	.....
Flour, feed and other grain mill products	.....	.....	.....	1,236.00	1,115.00	(a)
Wheat flour (million bbl.)	115.0	118.0	.....	910.00	820.00	.....
White flour (million bbl.)	.....	114.0	.....	.....	783.00	.....
Graham and whole wheat flour (million bbl.)	.....	0.8	.....	.....	5.0	.....
Rye flour (million bbl.)	1.6	1.7	.....	9.10	9.30	.....
Buckwheat flour (million lb.)	48.0	44.0	.....	2.00	1.70	.....
Other flour (million lb.)	.....	2.0	.....	.....	0.20	.....
Corn flour (million bbl. of 200 lb.)	9.7	0.4	.....	48.00	2.00	.....
Corn meal (million bbl. of 200 lb.)		9.5			43.00	
Bran and middlings	4.5	4.6	.....	138.00	142.00	.....
Feed, screenings, etc.	3.4	2.7	.....	129.00	97.00	.....
Ice (million tons of 2000 lb.)	40.0	40.0	— 0.3	187.00	183.00	— 2.1
Made in ice industry (million tons)	39.0	39.0	+ 0.4	181.00	178.00	— 1.5
From raw water (million tons)	28.0	32.0	+ 14.5	.....	.....	.....
Lard substitute, cooking fats and vegetable cooking oils	.....	.....	.....	(a)	193.00	.....
Lard substitutes and cooking fats (million lb.)	.....	1,239.0	.....	.....	143.00	.....
Made in industry (million lb.)	.....	775.0	.....	.....	89.00	.....
From veg. oils and fats (million lb.)	.....	537.0	.....	.....	62.00	.....
From animal and veg. fats and oils (million lb.)	.....	238.0	.....	.....	27.00	.....
Made as secondary product in slaughtering industry	.....	438.0	.....	.....	50.00	.....
Made as secondary product in other industries	.....	26.0	.....	.....	3.00	.....
Vegetable cooking oils	.....	516.0	.....	.....	50.00	.....
Made in industry	.....	468.0	.....	.....	46.00	.....
Made as secondary product in other industries	.....	47.0	.....	.....	4.60	.....
Macaroni, spaghetti, vermicelli, noodles and other pastes	.....	.....	.....	(b)	46.00	.....
Macaroni, spaghetti, vermicelli and plain or water noodles (million lb.)	.....	450.0	.....	.....	37.00	.....
Noodles, egg (million lb.)	.....	33.0	.....	.....	6.00	.....
Ravioli	.....	.....	.....	.....	0.20	.....
Other pastes	.....	.....	.....	.....	4.00	.....
Malt products	.....	.....	.....	24.00	20.00	— 15.9
Malt (million bushels)	22.2	21.7	— 2.0	22.00	19.00	— 14.5
Other products	.....	.....	.....	1.50	2.00	.....
Miscellaneous foods	.....	.....	.....	172.00	167.00	(a)
Peanuts, walnuts and other nuts processed	.....	.....	.....	(b)	61.00	.....
Peanuts	.....	.....	.....	.....	34.00	.....
Shelled raw (million lb.)	.....	287.0	.....	.....	23.00	.....
Cleaned and graded, not shelled (million lb.)	.....	130.0	.....	.....	10.00	.....
Blanched	.....	4.0	.....	.....	0.60	.....

TABLE II—PRODUCTION AND VALUE FIGURES FOR FOOD AND KINDRED PRODUCTS
(CONTINUED)

Commodity	Quantity Produced 1925	Quantity Produced 1927	Quantity Produced Increase (+) or Decrease (—) (Per Cent)	Value of Products 1925 Millions of Dollars	Value of Products 1927 Millions of Dollars	Value of Products Increase (+) or Decrease (—) (Per Cent)
Nuts, bleached or polished	.....	.....	.....	.....	18.00	.....
English walnuts (million lb.)	.....	81.0	.....	.....	14.00	.....
All others, principally almonds (million lb.)	.....	26.0	.....	.....	4.00	.....
Shelled nuts, not including peanuts	.....	.....	.....	.....	8.00	.....
English walnuts (million lb.)	.....	7.0	.....	.....	1.00	.....
All others, principally pecans (million lb.)	.....	16.0	.....	.....	7.00	.....
Oleomargarin (million lb.)	241.0	293.0	.....	48.00	52.00	.....
Made in oleomargin industry (million lb.)	168.0	180.0	.....	34.00	33.00	.....
Made in slaughtering and meat packing industry (million lb.)	67.0	87.0	.....	13.00	14.50	.....
Made as secondary product of other industries (million lb.)	6.0	27.0	.....	1.00	4.00	(b)
According to materials (not including products of slaughtering and meat packing industry)						
Composed of mixture of animal and veg. fats and oils (million lb.)	80.0	73.0	.....	17.00	15.00	.....
Composed solely of veg. oils (million lb.)	94.0	134.0	.....	18.00	22.00	.....
Rice cleaning and polishing	.....	.....	.....	53.00	54.00	+ 1.2
Clean rice (million lb.)	948.0	1,247.0	+ 31.5	51.00	52.00	+ 1.4
Polished (million lb.)	.....	929.0	.....	.....	43.00	.....
Brown (million lb.)	.....	76.0	.....	.....	3.00	.....
Polish (million lb.)	33.0	35.0	+ 5.8	0.50	0.40	— 9.9
Rice milled (thousand bushels)	115.0	140.0	+ 21.8	1.30	1.10	— 12.8
All other products	32.0	43.0	+ 33.1	0.60	0.70	+ 24.2
Sausage and sausage casings, not made in slaughtering and meat packing establishments	.....	.....	.....	82.40	81.50	— 1.1
Sausage, pork loaf, headcheese, etc.	.....	.....	.....	75.00	61.00	— 5.9
Sausage casings					9.00	
Other products	.....	.....	.....	7.00	10.00	+ 47.2
Slaughtering and meat packing	.....	.....	.....	3,050.00	3,057.00	+ 0.2
Fresh meat	.....	.....	.....	1,444.00	1,567.00	+ 8.5
Beef (million lb.)	5,064.0	5,083.0	+ 0.4	661.00	765.00	+ 15.7
Veal (million lb.)	576.0	550.0	— 4.6	87.00	98.00	+ 13.0
Mutton and lamb (million lb.)	522.0	547.0	+ 4.9	128.00	130.00	+ 1.6
Pork (million lb.)	2,828.0	3,110.0	+ 10.0	516.00	518.00	+ 0.3
Edible organs, tripe, etc. (million lb.)	487.0	509.0	+ 4.5	44.00	48.00	+ 8.4
Other fresh meat	53.0	59.0	+ 11.5	6.80	7.10	+ 4.4
Cured meat	.....	.....	.....	770.00	675.00	— 12.3
Beef, pickled and other cured (million lb.)	84.0	103.0	+ 22.0	18.00	23.00	+ 27.0
Pork, smoked (million lb.)	1,236.0	1,221.0	— 1.2	336.00	291.00	— 13.3
Pork, not smoked (million lb.)	2,060.0	1,913.0	— 7.1	416.00	311.00	— 25.1
Cooked hams (million lb.)	.....	134.0	.....	.....	49.00	.....
Canned meat and canned sausage (million lb.)	119.0	143.0	+ 20.8	24.00	28.00	+ 14.0
Sausage (not canned) meat puddings, headcheese, scrapple, etc. (million lb.)	904.0	919.0	+ 1.7	178.00	181.00	+ 1.5
Sausage casings (million lb.)	92.0	115.0	+ 25.6	19.00	22.00	+ 19.6
Lard	1,672.0	1,795.0	+ 7.3	280.00	235.00	— 16.0
Sugar Industry						
Beet sugar industry	.....	.....	.....	132.00	105.00	— 20.7
Sugar (thousand tons)	1,083.0	899.0	— 16.9	124.40	99.00	— 20.8
Granulated (thousand tons)	1,076.0	893.0	— 17.0	124.00	98.00	— 20.9
Unfinished (thousand tons)	7.0	6.0	— 15.0	0.38	0.44	+ 14.4
Molasses (thousand tons)	143.0	76.0	— 46.6	2.00	0.70	— 69.2
Beet pulp (thousand tons)	1,550.0	1,308.0	— 15.6	5.50	4.40	— 20.2
Miscellaneous products	.....	.....	.....	0.10	1.02	(a)
Cane sugar manufacture	.....	.....	.....	13.00	8.00	— 40.4
Sugar (thousand tons)	116.0	56.0	— 51.3	10.00	5.00	— 47.1
Granulated (thousand tons)	16.0	7.0	— 53.4	1.60	0.70	— 56.4
Clarified (thousand tons)	12.0	3.0	— 72.1	1.00	0.30	— 69.9
Raw (thousand tons)	88.0	46.0	— 48.2	7.00	4.00	— 41.9
Sirup (million gallons)	6.0	4.0	— 31.8	1.70	1.30	— 24.1
Molasses, other than blackstrap (million gallons)	6.0	3.0	— 40.5	1.10	0.90	— 18.0
Blackstrap molasses (million gallons)	10.0	2.0	— 76.2	0.60	0.20	— 69.0
Bagasse, sold as such (million gallons)	(b)	69.0	.....	0.20	0.40	+ 81.7
Cane sugar refining	.....	.....	.....	607.00	597.00	— 1.5
Refined sugar, hard (thousand tons)	5,244.0	4,928.0	— 6.0	583.00	573.00	— 1.8
Refined sugar, soft or brown (thousand tons)	168.0	200.0	+ 19.0	17.00	21.00	+ 24.2
Refiner's sirup, edible (thousand gal.)	8,536.0	5,537.0	— 35.1	2.00	1.00	— 42.0
Refiners blackstrap and nonedible sirup (thousand gal.)	37,373.0	31,014.0	— 17.0	4.00	2.00	— 43.7
All other products	.....	.....	.....	0.50	0.40	— 20.7
Vinegar and cider	.....	.....	.....	18.00	16.00	— 14.3
Vinegar	.....	.....	.....	16.00	14.00	— 16.1
Cider	.....	.....	.....	2.00	2.00	+ 1.5

(a) Data available but not comparable.
(b) No data available.

Large Fisheries Merger

The National Fish Company, of Halifax is to merge with the Atlantic Coast Fisheries, Inc. Negotiations are also under way relative to a possible merger of the Maritime Fish Corporation, also of Nova Scotia, with Atlantic.

Standard Bottle Finishes Adopted by Glass Container Association

WITH the announcement of new standards of bottle-neck finish for catsup bottles and their immediate acceptance by the glass container and cap manufacturers there now remains only the further step of their unreserved acceptance by the catsup makers. By these standards the user of bottles is assured that bottles or caps manufactured to the new specifications will fit perfectly irrespective of the identity of the makers. Commercial tests carried out in the 1928 catsup pack proved the new standards practicable.

A feature of this simplification is an identical locking-ring on all four finishes that permits the catsup packer to use any of the known sealing caps. Also there is only one standard size of friction cap and of screw cap to be manufactured according to these specifications. The standards are the result of research and development carried out by a sub-committee of the Standardization Committee of the Glass Container Association, 19 West 44th Street, New York City, under the chairmanship of P. C. Doyle. The sub-committee was headed by F. L. Lloyd. As a result no longer will a catsup packer have bottles and caps that do not fit if he purchases his supplies in accordance with the simplified specifications. They are shown graphically on the opposite page.

Caps and finishes for Chili sauce bottles are now undergoing study by the committee and it is believed that they will be reduced to two specifications.

New Condiment Finishes

G. C. A. No. 200 Standard covers the Screw Cap type of finish for use on sealing machines not having the Crown feeding platform attachment.

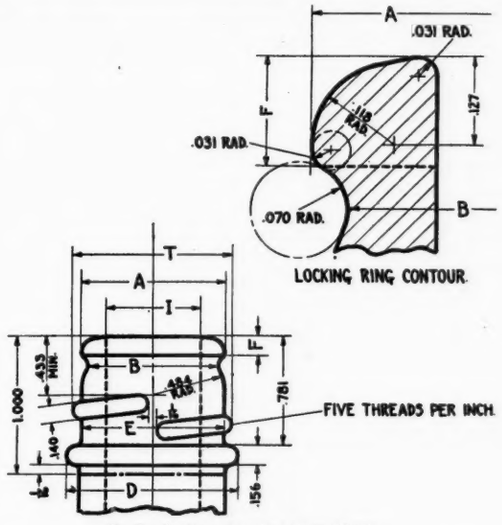
G. C. A. No. 225 Standard covers the Screw Cap type of finish for use on sealing machines of any make that do have the Crown feeding platform attachment.

G. C. A. No. 250 Standard covers the Friction Cap type of finish for use on sealing machines not having the Crown feeding platform attachment.

G. C. A. No. 275 Standard covers the Friction Cap type of finish for use on sealing machines of any make that do have the Crown feeding platform attachment.

United Biscuit Dissolves

After selling its business and assets to United Biscuit Company of America in 1927 the old United Biscuit Company shareholders approved the plan of dissolution to take place on March 1, 1929. Details of the plan were reported on page 285, March FOOD INDUSTRIES.



G. C. A. No. 200 GLASS FINISH

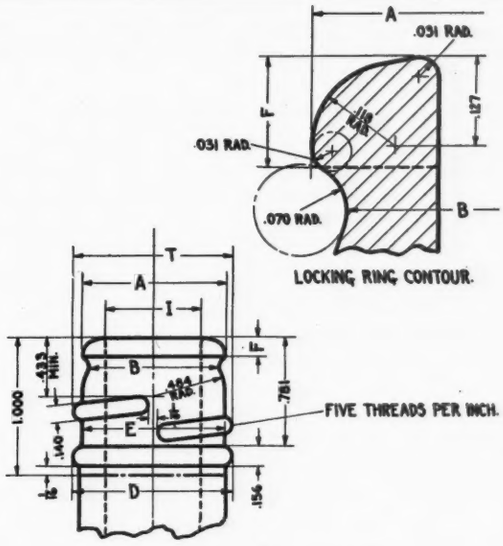
COMBINATION GOLDY, CROWN, HANDYCAP, & SCREW CAP CONDIMENT FINISH.

Note: Do Not Use for Crown Caps Applied with Machines Equipped with Crown Feeding Platforms. See G. C. A. No. 225 Finish.

No. or Size	A Max.	A Min.	B Max.	B Min.	I Min.	T Max.	T Min.	E Max.	E Min.	D Max.	D Min.	F Max.	F Min.
26	1.042	1.017	0.948	0.923	0.594	1.180	1 150	1.050	1.020	1.235	1.205	0.156	0.140

NOTES:

1.—The applied sealing cap should not exceed a maximum diameter of 1.125, for size 26; and gauges for this purpose will be furnished to the packer by the Glass Container Association.
2.—Correct models of the neck finishes should be secured from the Glass Container Association, and used always in conjunction with the blueprints.
3.—G. C. A. No. 250 or G. C. A. No. 275 finish should be used if a friction cap is desired, or these finishes can also be used for non-pressure glass when no overall cap is desired.



G. C. A. No. 225 GLASS FINISH

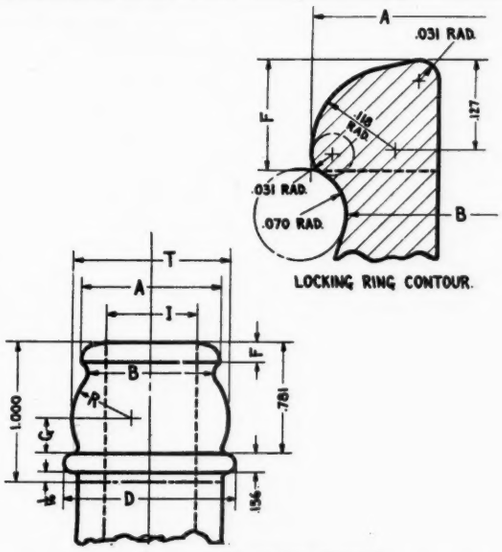
COMBINATION GOLDY, CROWN, HANDYCAP, & SCREW CAP CONDIMENT FINISH.

Note: This Finish is Suitable for Crown Caps Regardless of the Type of Machine Used in Applying Them.

No. or Size	A Max.	A Min.	B Max.	B Min.	I Min.	T Max.	T Min.	E Max.	E Min.	D Max.	D Min.	F Max.	F Min.
26	1.042	1.017	0.948	0.923	0.594	1.180	1.150	1.050	1.020	1.180	1.150	0.156	0.140

NOTES:

1.—The applied sealing cap should not exceed a maximum diameter of 1.125, for size 26; and gauges for this purpose will be furnished to the packer by the Glass Container Association.
2.—Correct models of the neck finishes should be secured from the Glass Container Association, and used always in conjunction with the blueprints.
3.—G. C. A. No. 250 or G. C. A. No. 275 finish should be used if a friction cap is desired, or these finishes can also be used for non-pressure glass when no overall cap is desired



G. C. A. No. 250 GLASS FINISH

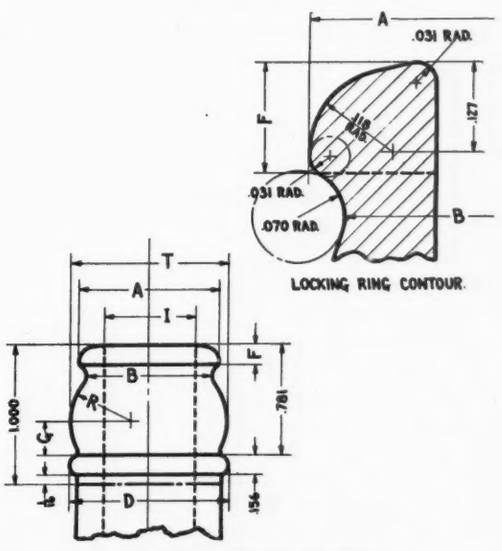
COMBINATION GOLDY, CROWN, HANDYCAP, & FRICTION CAP CONDIMENT FINISH.

Note: Do Not Use for Crown Caps Applied with Machines Equipped with Crown Feeding Platforms. See G. C. A. No. 275 Finish.

No. or Size	A Max.	A Min.	B Max.	B Min.	I Min.	T Max.	T Min.	G	R	D Max.	D Min.	F Max.	F Min.
26	1.042	1.017	0.948	0.923	0.594	1.170	1.145	0.250	0.437	1.235	1.205	0.156	0.140

NOTES:

1.—The applied sealing cap should not exceed a maximum diameter of 1.125, for size 26; and gauges for this purpose will be furnished to the packer by the Glass Container Association.
2.—Correct models of the neck finishes should be secured from the Glass Container Association, and used always in conjunction with the blueprints.
3.—The finish as shown can also be used for non-pressure glass when no overall cap is desired.
4.—G. C. A. No. 200 or G. C. A. No. 225 glass finish should be used if an overall screw cap is desired.



G. C. A. No. 275 GLASS FINISH

COMBINATION GOLDY, CROWN, HANDYCAP, & FRICTION CAP CONDIMENT FINISH.

Note: This Finish is Suitable for Crown Caps Regardless of the Type of Machine Used in Applying Them

No. or Size	A Max.	A Min.	B Max.	B Min.	I Min.	T Max.	T Min.	G	R	D Max.	D Min.	F Max.	F Min.
26	1.042	1 017	0.948	0.923	0.594	1.170	1.145	0.250	0.437	1.180	1.150	0.156	0.140

NOTES:

1.—The applied sealing cap should not exceed a maximum diameter of 1.125, for size 26; and gauges for this purpose will be furnished to the packer by the Glass Container Association.
2.—Correct models of the neck finishes should be secured from the Glass Container Association, and used always in conjunction with the blueprints.
3.—The finish as shown can also be used for non-pressure glass when no overall cap is desired.
4.—G. C. A. No. 200 or G. C. A. No. 225 glass finish should be used if an overall screw cap is desired.

ABSTRACTS · OF · CURRENT · LITERATURE

SUGAR IN BAGASSE. A. H. Allen. *Sugar* 30, 564-5, Dec., 1928; in Spanish. A table is given for determination of the percentage of sugar in bagasse, using a sample of 100 grams in 500 grams of water, and 5 grams (4.9 c.c.) of a 5 per cent solution of sodium carbonate. Readings are taken in a 400-mm. tube. The procedure is described. Digestion may be carried out in a flask under a reflux condenser, or in a copper cylinder equipped with a brass cooling coil, instead of in a rotary digester. It is essential, for use of the table, that the procedure be correctly followed and that no water be added during or after the digestion. The table is in two halves, one for the more common samples with up to 5.5 per cent sugar, the other for bagasse high in sugar (up to 10.5 per cent).

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DAIRY INDUSTRY. L. Eberlein. *Zeitschrift für angewandte Chemie* 41, 1255-7, 1279-81, Nov. 24 and Dec. 1, 1928. Recent advances in dairy technology are reviewed under three headings: fresh milk, evaporated milk, casein. Under the first heading, improvements in handling and pasteurizing, and in maintaining quality, are considered. Considerable space is devoted to irradiation with ultra-violet light as a means of increasing the antirachitic potency of fresh milk. Topics concerning evaporated milk include condensing and canning of sweetened and unsweetened milk, prevention of "sandiness," improvements in vacuum evaporators, and sterilizing of the canned product. Under casein, production of edible casein products, and production and uses of casein paints, adhesives and plastics are considered. Literature references are cited.

* * *

OIL EXTRACTOR. Antonin Rolet. *Matieres Grasses*, 20, 8364-7, Dec., 1928. A first-grade edible olive oil must be clear, nearly neutral, and have a mild, slightly fruity taste without any disagreeable flavor. The ordinary process of grinding ripe olives and pressing the pulp not being entirely satisfactory, the Olericulture Laboratory in France has tried out the Acapulco system. This extractor, developed in Spain, utilizes the purely physical principles of density difference, capillarity and surface tension for separation of the water and oil from the seeded olive pulp. The olives are first run through a seeder, which macerates the pulp and separates it from the seeds. The extractor is a vat, having at its bottom a nickel gauze filter. Metal baffles, each of which has a strip of rubber along its edge, are carried on a central shaft. The oil produced in this extractor is satisfactory in purity, taste, and acidity. Advantages of the Acapulco system are: economies in labor and material costs, and a slightly higher yield of pulp oil than in the grinding and pressing system. Disadvantages are: a loss of about 4 per cent of the pulp (adhering to the seeds), and total loss of the seed oil, seeds from the Acapulco separator being good only for fuel.

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SLAUGHTER-HOUSE EFFLUENTS. A. B. Porter and J. B. Cresswick. *Journal of the Society of Chemical Industry*, Vol. 47, pp. 380-2, Dec. 28, 1928. Wastes from meat-packing establishments may be classified as slaughter-house effluent (a mixture of salt and fresh water containing about 0.5 per cent blood), byproduct effluents containing proteins in solution, and casing-house effluents (from sausage-casing manufacture) containing proteins in suspension and solution. To prevent formation of offensive gases such as H_2S, it is important to eliminate solids at the source of production, to prevent delays before discharging into sewers, to eliminate hot discharges during times of small flow, e. g. at night, and to clean and sterilize the plant during shutdowns. Preliminary treatments for lessening the gas nuisance are described, and the effects of paunch, paunch manure, and temperature on H_2S formation are reported.

* * *

ADIPIC ACID. Walther Schrauth. *Chemiker-Zeitung*, Vol. 53, pp. 41-3, Jan. 12, 1929. Difficulties which formerly prevented the commercial production of adipic acid at a price competitive with tartaric acid have now been overcome, and the acid is being marketed in Germany. The basis of the process, as worked out by the Deutsche Hydrierwerke Company, is the hydrogenation of phenols and cresols. The difficult step in the process has been to subject the resulting hydro-aromatic compounds to controlled oxidation at a sufficiently low cost. Success having been achieved in this direction, adipic acid and its homologs can now be made on a large scale at relatively low cost. The acid number of adipic acid is 767; it melts at 151 deg. C.; and its other physical properties, including its behavior toward bicarbonates, make it eminently suitable for use instead of tartaric acid in baking powders, fruit essences, lemonades, effervescent salts, and the like. In baking powder a gram of adipic acid liberates 0.6 gram of CO_2, as compared with 0.58 gram from tartaric acid, 0.32 gram from Ca biphosphate, and only 0.23 gram from the acid tartrate commonly used. Moreover, adipic acid is not hygroscopic like tartrate, and has a better taste than biphosphate. Esters of adipic acid and its homologs have many uses in the arts; for instance, in perfumery and flavoring extracts.

MASH MAKING APPARATUS. E. Lühder. *Apparatebau* 40, 289-91, Dec. 14, 1928. For many years efforts have been made to combine in one apparatus the steam boiling and mashing of potatoes, cereals, and the like for fermentation. High costs were against the older attempts; and modern improvements in equipment for each of the separate processes lessened the need for the combination. The Rau apparatus, patented recently in Germany, successfully meets the necessary conditions, constituting an improvement over the separate operations, even when they are carried out with the best modern apparatus. Installation cost for the apparatus is lower; operating time is shortened; fuel and other materials are saved; production is simplified—so there is a considerable saving in the production cost. In common with some of the older devices, the Rau apparatus is essentially a modified combination of the Henze pressure steamer and a mashing vat; but it embodies certain radical improvements.

* * *

SOLVENT EXTRACTION. *Chemical Age* 19, 485-6, 1928. A post-war slump in the demand for oil extraction equipment for treating oil seeds and nuts led the makers to seek other markets. As a result, it has been demonstrated that solvent extraction has several advantages over the older "rendering" methods for recovering animal fats, and is also suitable for obtaining fish oils. Some sort of rendering process is still necessary for producing the high-grade edible oils; but such processes are relatively inefficient, and there is a large field for the recovery of technical fats as byproducts by solvent extraction of the residues from rendered edible fats. In the production of fish oils, solvent extraction has the double advantage of recovering oil otherwise wasted, and giving a better quality fish meal. Similarly, when animal residues are utilized for making stock feed, solvent extraction improves the quality of the residue for use in feeds and recovers a useful technical fat. For waste animal products not used for edible fats, solvent extraction is ideal, it permitting removal of water and fat at the same time. Advantages of the Scott method and equipment are emphasized.

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BANANA VINEGAR. Harry von Loesecke. *Industrial & Engineering Chemistry*, Vol. 21, pp. 175-6, Feb., 1929. Banana vinegar has been successfully made on a laboratory scale. Color, aroma, and taste were pleasing. The method of production was to make a mash from the pulp and peel of ripe bananas, pasteurize at 75 deg. C. for 45 min., cool, and inoculate with a pure

culture of *Saccharomyces ellipsoideus.* After vigorous fermentation began (about three days at 20-23 deg. C.) this mash was used as a starter for a larger quantity of pasteurized mash. The pasteurization is necessary because banana mash abounds in acetifying bacteria, which must not be allowed to act in the early stages of the proceess. Acetification was effected by trickling the fermented liquor over beechwood shavings which had been boiled in water, and dried and soaked in strong vinegar; but control of air supply was too difficult in the small laboratory apparatus. Better results were obtained by the Orleans process, in which the fermented juice is brought to a suitable acidity for bacterial acetification by addition of strong vinegar.

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USE OF ULTRA-VIOLET LIGHT IN JUDGING GRAIN. *Northwestern Miller,* Vol. 157, Jan. 9, 1929, p. 144. J. Tausz and H. Rumm (translation from *Zeitschrift für das gesamte Mühlenwesen*). Under the rays of a quartz ultra-violet lamp different wheats show different fluorescences, or colors. The characteristic color was not changed by heating the berry, but time alone caused a far-reaching change. By such a method one can rapidly distinguish the new crop wheat from that of the previous year. The translator suggests that perhaps by the development of this method we can learn more about the nature of grain and its products.

* * *

IRRADIATED ERGOSTEROL. Georges Tixier. *Comptes rendus de l'Academie des Sciences,* Vol. 188, pp. 206-8, Jan. 7, 1929. Making a biological test of irradiated ergosterol to ascertain whether it has actually acquired antirachitic properties is a tedious and unsatisfactory procedure. Advantage has therefore been taken of the fact that truly activated ergosterol has increased transparency to light in the range from 2,400 to 2,950 angstroms, and on this basis a spectrographic method for evaluating the activation has been developed. Under properly controlled conditions this test agrees very well with the biological assay. A similar test for old preparations of ergosterol is under way.

* * *

FATTY OIL PLANT. Thomas Andrews. *Oil & Fat Industries,* Vol. 6, pp. 15-17, Jan., 1929. Methods and equipment used in pumping, piping, and heating oils and fats are described. A well erected screwed pipe line carries oil with practically no loss. Cast iron, steel, brass, copper, lead, and vitreous ware all have their place in the piping layout of a plant for the producing and processing of fats and oils. Descriptions and illustrations are given of centrifugal, rotary, simplex and duplex pumps, and of a heavy-duty boiler-feed pump. For large-scale operation, the pneumatic (montejus) system of moving or raising oils is also satisfactory. The best heating medium may be, according to conditions, direct fire, gas, electricity, or steam.

· CRITICAL · BOOK · REVIEWS ·

FUNDAMENTALS OF DAIRY SCIENCE. By Associates of Rogers. Comprises 543 pages. Published by the Chemical Catalogue Company, New York. Price $5.50.

This book meets the need that every plant manager, investigator, and teacher has felt for up-to-date and authoritative information in the English language as to the latest developments in the science of dairying, and particularly with respect to material contained in periodical literature not yet presented in text books.

The busy man with a limited library at his disposal who wants to know how far a new proposition rests on fact, and how far it is only a possibility as yet unproven, finds in the new volume clear and concise statements covering the field, written by men who are equipped to evaluate the basis and merit of each development.

Fifteen chapters, by over a score of specialists, present in admirable perspective the facts and theories with which the modern dairy expert should be familiar, covering (1) the components of milk, (2) the physical and chemical changes that these undergo, and their correlations, (3) the bacteria of milk and their relative importance, and (4) the secretion and nutritive value of milk. These topics, discussed in their relations to all branches of dairy manufactures and commerce, turn out to be not dry-as-dust tables of figures, but interesting and often fascinating reading, such that the reader hesitates to skip a page for fear of missing a fruitful suggestion, applicable to his own problem.

College students beginning a scientific or commercial career in dairying can hardly fail to gather from this book the essential features that must characterize any useful contribution to dairy science, including the selection of a problem that can be handled successfully with the means available, and the patient pursuit of each selected problem from various points of attack until a complete and satisfactory demonstration is attained.

The name of Rogers and those of the several contributors to the new book afford sufficient guarantee of the authenticity of the contents. The work as a whole is a signal contribution to dairy literature, the first in its field in the English language, and is a monument to the scientist who inspired its production.

With this new book at his elbow the every-day worker, the plant manager, teacher or investigator can take a new grip on his task, and find his labor lightened and illuminated in most helpful fashion.

J. L. SAMMIS.

· GOVERNMENT · PUBLICATIONS ·

Documents are available at prices indicated from Superintendent of Documents, Government Printing office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.

British Market for American Dairy Equipment and Supplies, by Brice M. Mace, Jr. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 598. Ten cents.

Salt, Bromine, and Calcium Chloride in 1927, by A. T. Coons, Bureau of Mines Mineral Resources pamphlet. Five cents.

Essentials for the Successful Operation of a Local Creamery, by William White. U. S. Department of Agriculture Miscellaneous Publication 37. Five cents. Relates primarily to neighborhood and small local plants, but equipment lists included are very suggestive of useful information for larger establishments.

Standards Yearbook, 1929. Issued by the Bureau of Standards. $1.00. This volume is the third in this series of annual reviews covering not only work of the Bureau of Standards, but also other standardization activities of the United States and of an international character.

Internal Revenue Regulations. U. S. Bureau of Internal Revenue Regulations No. 75, relating to consolidated returns of affiliated corporations prescribed under Section 141 (b) of the Revenue Act of 1928 (applicable to the taxable year 1929 and subsequent taxable years). Ten cents.

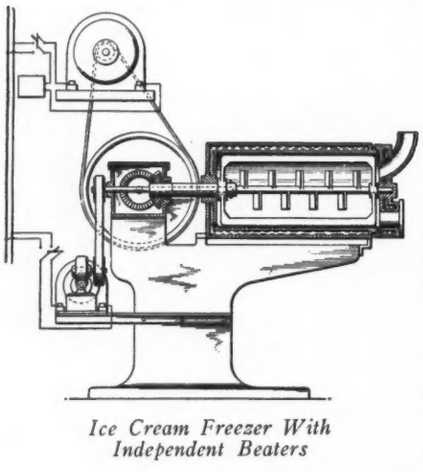
Production Statistics. Census of Manufactures data for tomatoes canned in 1928; a summary for all manufacturing industries, including the food industries group, from the Census of Manufactures, 1927; and additional special sheets from that census for: Flour and Other Grain-Mill Products; Oleomargarin and Other Butter Substitutes; Lard Substitutes, Cooking Fats, and Vegetable Cooking Oils; Tin Plate and Terneplate; Canned Fish and Fish Products; Butter, Cheese, and Condensed Milk; Cereal Products; Bread and Other Bakery Products; and Canning and Preserving (Fruits and Vegetable, Pickles, Jellies, Preserves, and Sauces). A statistical summary of these data is found in the news pages of this issue of FOOD INDUSTRIES, Mimeographed summaries are available on request from the Bureau of the Census.

· SELECTED · PATENTS ·

Ice Cream Freezer

Grover D. Turnbow, of Davis, Calif., assignor of one-half to Chester E. Gray, of Oakland, Calif. No. 1,699,170. Jan. 15, 1929.

An apparatus for the manufacture of ice cream is described in which the incorporation of air or carbon dioxide is carefully controlled. Experiments show that in the art the practice of beating and freezing the mixture simultaneously



Ice Cream Freezer With Independent Beaters

results in the viscosity of the ingredients being considerably altered and further results in an ice cream which is not as stable as desired; one which is sensitive to heat shock, and which is not capable of holding the incorporated air very well.

The fundamental point of the invention is to freeze the mixture without affecting the viscosity of its contents and then agitate the frozen mixture to incorporate air and subsequently remove the frozen mixture without materially affecting the air content. This is accomplished by having independent heaters and scrapers in the freezer, each driven by an individual motor. The scraper is driven while the batch is freezing. After it has become frozen, the other motor is started, which operates the beater until the proper amount of air or carbon dioxide has been incorporated. Both of them are allowed to remain at rest while the machine is being discharged.

Prevention of Discoloration of Canned Foods

G. S. Bohart, San Francisco, Calif., assignor to National Canners Association, Washington, D. C. No. 1,699,274. Jan. 15, 1929.

In the preparation of canned foods sulphur compounds are found occasionally which react with iron on the tin plate to produce a dark-colored substance that is objectionable in appearance. It has been found that the interior of the can may be coated with an enamel containing an insoluble metallic compound, such as zinc oxide or zinc phosphate, or a mixture of the two in rather small quantities which will have the effect of capturing the hydrogen sulphide produced during the processing of the foods, or subsequently, and converting it into an unobjectionable compound. Magnesium and aluminum powder are also satisfactory. Four different formulas of enamels are given.

Continuous Fat and Oil Extractor

J. R. Sterling, London, England, No. 1,694,361. December 4, 1928.

An apparatus for the extraction of water, oil and fatty matter from solid material of animal or vegetable nature such as fish, offal, and oil-bearing seeds. It consists essentially of three inclined extraction chambers containing a chain-belt drag-conveyor in each chamber. In the central part of each chamber is a dividing wall, and one side of the chain conveyor is in each half. Material is fed into the first of these chambers and is carried downward by the descending side of the belt and upward on the lower side of the incline by the ascending belt. Near the upper part of the chamber it passes a discharge hole, where it falls into the next succeeding unit of the extraction apparatus and the process is repeated. After passing through the second unit it progresses through a third. The extracting medium is contained in each of the units and the flow of the solvent is counter-current to the flow of the material to be extracted.

The whole apparatus is arranged so that it is a closed system and vapors cannot escape. A distilling device is shown for recovery of the solvent and separation from the oil.

Vitamin Synthesis

Jacques W. D. Chesney, Chicago, assignor to Solar Research Corporation, Chicago. No. 1,704,173. March 5, 1929.

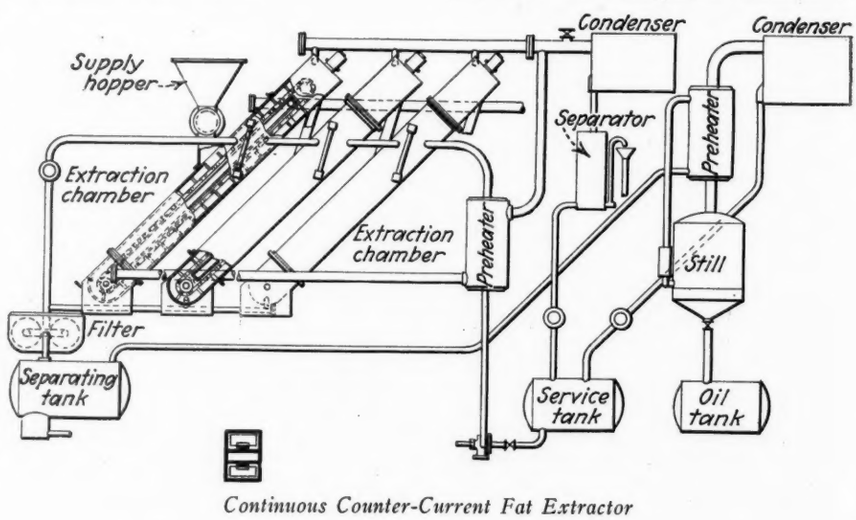
The much discussed Chesney process of generating vitamin D by the activation of sterols through photochemical action of ultra-violet rays from sunlight or skylight. Heat rays are absorbed from sunlight and wave lengths of 2,900-3,700 Angstrom units are reflected and concentrated on the food or food constituent to be treated. Apparatus transparent to ultra-violet rays is used.

Bleaching of Foodstuffs

William B. Stoddard, of Stamford, Conn., and Vaman R. Kokatnur, of Arlington, N. J., assignors to Pilot Laboratory, Inc., Arlington, N. J. No. 1,687,805. Oct. 16, 1928.

This patent is apparently an effort to get away from the objections raised by certain regulatory bodies regarding the use of organic peroxides such as benzoyl peroxide for bleaching foods. The process is the result of an effort to find a bleaching agent which will leave the food without a residue other than a recognized wholesome food material.

It has been found that peroxidized food constituents may be added to the food to be bleached and that the previously treated substance will bleach the whole mass. By the term peroxidized food constituents are included peroxide compounds as given in a long list, such as compounds of alcohol, glycerin, cholesterol, phytosterol, glucose, various organic acids, etc., except anisic and amino acids. According to this plan of bleaching, the bleaching peroxide food constituent is chosen from the same kind of food that is to be bleached. For example, if the food to



Continuous Counter-Current Fat Extractor

be bleached is flour, the coloring matter in the flour will be carotin. Therefore the bleaching agent will be a peroxide of a fatty acid chemically similar to the fatty substances found in the flour. The same method of bleaching applies also to the bleaching of molasses. Methods of calculating the amount of substance to be used are given.

Reclaiming Attachment for Scalpers

John J. Varusky, Minneapolis, Minn., assignor to Carter-Mayhew Manufacturing Company, Minneapolis, Minn. No. 1,690,513. Nov. 6, 1928.

A device to use upon grain scalpers to recover grain carried over in the tailings. Particularly applicable to the scalper patented by Clarence W. Carter, U. S. patent No. 1,568,267, Jan. 5, 1926. The grain passes over a rotary scalping screen. The sticks, stones, pieces of paper, nails and other trash, together with a small amount of grain, which it is desirable to recover, fall onto a perforated belt which is given a vibratory motion by a mechanical tapping device operating underneath. By means of the vibration the grain is rattled through the perforations of the belt.

Artificial Coffee Aroma

Hermann Staudinger, Freiburg, Germany, and Thadeus Reichstein, Zurich, Switzerland, assignors to Internationale Nahrungsund Genussmittel Aktiengesellschaft, Schaffhausen, Germany. No. 1,696,419. Dec. 25, 1928.

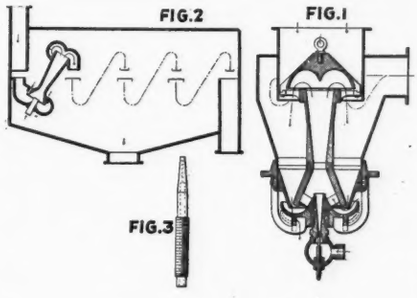
An interesting and exceedingly technical patent (too long for any but a superficial abstract, covering a method of artificially mixing substances known to be constituents of the aroma of coffee, or substances which are chemically similar thereto. The ten previously known constituents of coffee aroma are listed. Thirty or forty constituents previously unknown are described—some of them of special importance in producing the aroma of coffee. These substances are not phenols or nitrogen compounds, but are fugitive sulphur compounds of the mercaptan series of the general formula ASH, or its derivatives, particularly the oxy-sulphide of the formula $RCH\langle^{OH}_{SA}$. It has been observed that certain sulphurous compounds found in the aroma of coffee may be imitated quite successfully by synthetic chemicals having a similar structure: for instance, furfuryl-mercaptan may be replaced by thienyl-mercaptan, or benzyl-mercaptan.

It has been found that it is not essential to add all of the constituent parts of the natural aroma to produce a synthetic aroma, the addition of certain of them effecting slight improvement.

Grain Cleaner

Luigi Negro, Bucharest, Rumania. No. 1,699,441. Jan. 15, 1929.

This grain cleaner has two purposes: (1) to render inactive the diastase which is contained in the husks of a grain, such as wheat; and (2) to remove completely the woody part of the grain. This is accomplished by forcibly moving the grain with great velocity through a conduit by means of a jet of steam or air, or a combination of both, the separation being effected



Grain cleaning system

by the friction, heat, and any moisture that may be present.

The apparatus is composed of one or more Venturi tubes or injectors through which the grain is shot at high velocity against one or more curving surfaces. The apparatus described covers a single unit which either may be used repeatedly or used as a multiple unit through which the grain will pass until, when leaving the last unit, it is fully husked. The heat treatment is supposed to render the diastase inactive, and involves bringing the grain to a temperature of between 60 and 80 deg. C. The separation of the husks occurs within 3-4 min., and yet it is claimed that the increase in the moisture of the core of the grain is not more than one per cent.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Cherry Pitter

Giovanni Frova, Milan, Italy. No. 1,698,477. Jan. 8, 1929.

An automatic cherry pitter for removal of pits and stems. In contrast with the American types of cherry-pitting machinery, this new machine, instead of punching the pits through the cherry, has a device which reaches into the cherry, seizes the pit and pulls it out. The machine consists of a series of vertical tubes through which the cherries fall, but an essential feature is that they must be picked with their stems on. This causes the stem end to turn upward when falling. The cherry drops into a cup, which is mounted on the exterior of a cylinder. By rotating 90 deg., the stem of the cherry is placed in a horizontal position. In this position the pit-gripping device moves forward and extracts the pit and stem. After the next motion of the machine the pitted cherry falls out.

Preventing Pinholing in Canned Strawberries

Oswald H. Hansen, Port Washington, Wis., assignor to Hansen Canning Machinery Corporation, Cedarburg, Wis. No. 1,696,399. Dec. 25, 1928.

The invention covers the process and apparatus for canning acid fruits such as strawberries and cherries, and is devised to eliminate the pinholing which takes place in strawberries by means of expelling the gases from the berries before canning. Hansen states that with the prior processes it is practically impossible effectively to release and expel the gases during the usual exhausting operations, because of the fact that each batch of the mixture constitutes so relatively thick a mass that it requires excessive heating of the exterior of these masses to produce sufficient heating in the interior portions. The sudden excessive heating has been found to produce a "killing" effect whereby the free escape of the confined gases is positively prevented.

In the new method the berries are exhausted, sterilized, and cooked individually before being placed in the containers in a slow uniform treatment, in relatively a dry condition, and with gentle agitation. The special apparatus devised to carry out this purpose will be described later. After the fruit has been properly conditioned, it is placed in sterilized receptacles and covered with hot, sterile sirup, after which sterile covers are then applied to the can. It is claimed that fruit thus treated is free from destructive gases which bring about pinholing and other spoilage.

The apparatus consists of a vertical cylinder, jacketed with steam-heating apparatus. Within the cylinder are a number of horizontal pans above each of which is a spider whose arms are so arranged as to move the berries forward around the pan without injury. The berries are fed into the top pan from a hopper and after completing the circuit of the first pan pass through a hole to the second and complete the circuit, dropping successively into other pans, all the while being heated by the jacket surrounding the entire apparatus.

A complete line-up is described, including the exhausting apparatus, can sterilizer, filling apparatus, siruper, sterile cover feeder, automatic closing machine, labeling machine, and casing machine. The patent claims, however, cover only the process of treating the fruit and subsequently immersing the heated berries in hot sirup.

PRACTICAL · OPERATING · DETAILS

Delivering Two Streams of Cased Goods Underneath a Railroad Track on a Single Conveyor

By G. W. Foster
A. & P. Products Corporation, Brockport, N. Y.

CONVEYING cased goods from one building to another is the cause of much expense. The problem can be solved in a number of different ways, but the most interesting solution is that which will do the work with the least cost. Goods are labeled and cased on two lines in one building and must be transferred to a shipping department about 400 ft. away. During the transfer they must cross a railroad track, which may be done either high in the air or underneath the track. At the A. & P. plant the latter method is used.

Two parallel ball-bearing roller conveyors lead from the casing machines to a "Y" intersection where the delivery from both lines is combined onto a single conveyor. Without a special device the goods would clog up the "Y" and soon stop all movement. The device which regulates the traffic is an automatic timer which is shown in Fig. 1. A motor-driven cam applies a set of rubber-lined brake-shoes alternately to each side. Thus the goods on one side are held back while the goods on the other side are permitted to move forward, and no clogging ever occurs at the "Y."

The 1,500-r.p.m. speed of the motor is reduced to 2 r.p.m. of the cam by means of a speed reducer.

The roller conveyor makes a slight turn after leaving the "Y" and passes through a tunnel under the railroad track. After emerging from the tunnel the conveyor discharges onto an elevating conveyor that raises the goods high enough to permit them to travel by gravity on another roller conveyor to the warehouse.

Conveyors are steel roller, ball-bearing type, 16 in. wide, with rolls 4 in. on centers. The slope is 6 in. in 10 ft. The elevating conveyor is a piece of roller conveyor with a power-driven belt on the top side. Its slope should not exceed 18 in. in 10 ft., because if it is steeper the cases will slip or roll backward unless cleats are provided on the belt. The belt is driven by a small motor operating through a train of gears. At the lower end of the installation is a wide-faced idler pulley equipped with takeups.

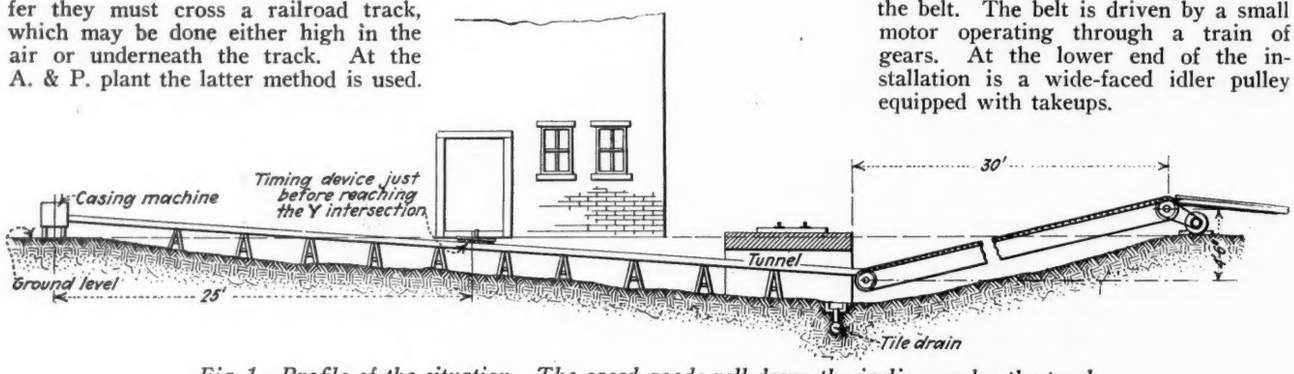
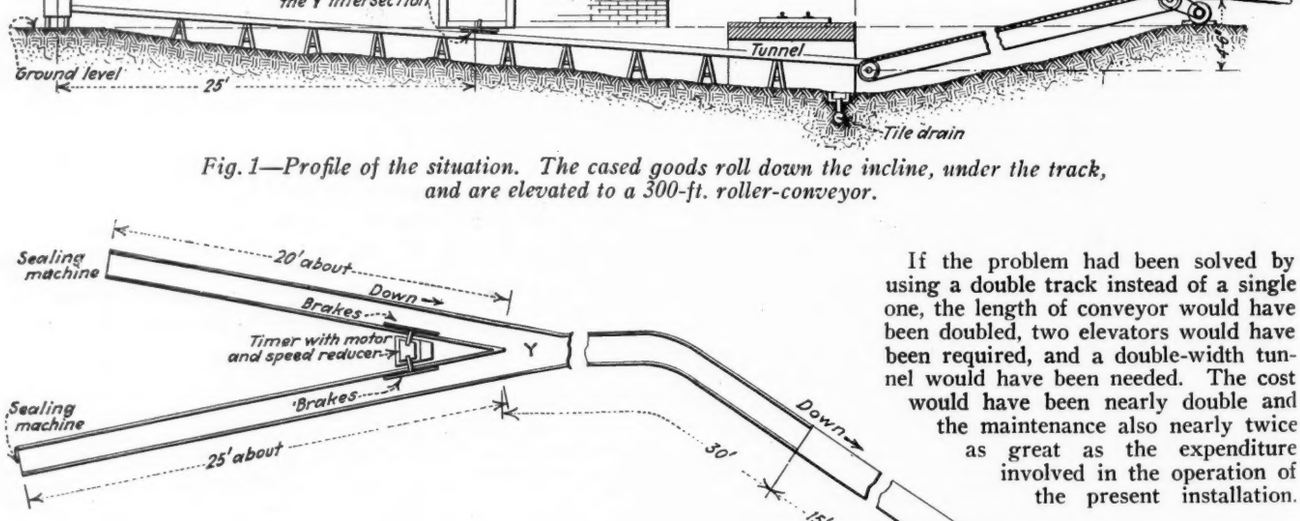


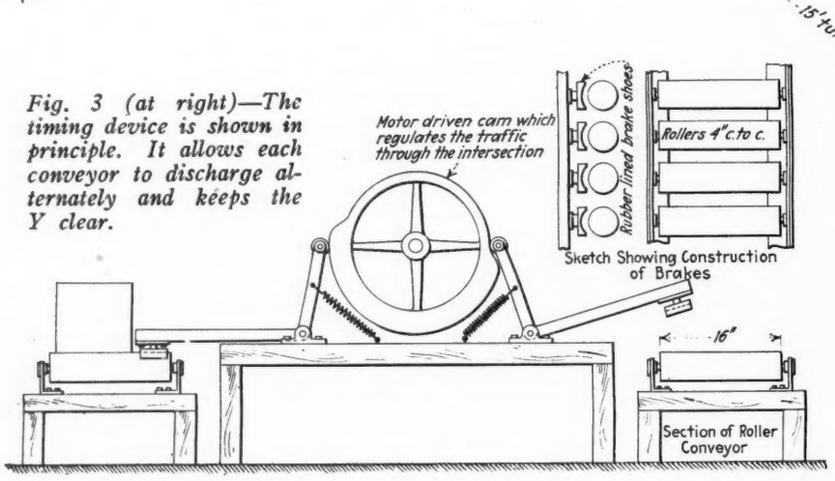
Fig. 1—Profile of the situation. The cased goods roll down the incline, under the track, and are elevated to a 300-ft. roller-conveyor.



If the problem had been solved by using a double track instead of a single one, the length of conveyor would have been doubled, two elevators would have been required, and a double-width tunnel would have been needed. The cost would have been nearly double and the maintenance also nearly twice as great as the expenditure involved in the operation of the present installation.

Fig. 2 (above)—Plan of the conveyor system. Two streams of cases must be combined into one without piling up in a heap.

Fig. 3 (at right)—The timing device is shown in principle. It allows each conveyor to discharge alternately and keeps the Y clear.


Motor driven cam which regulates the traffic through the intersection
Rubber lined brake shoes
Rollers 4" c. to c.
Sketch Showing Construction of Brakes
16"
Section of Roller Conveyor

· WHAT'S · ON · YOUR · MIND? ·

An open forum for the exchange of opinion

Corn Sugar: A Controversial Issue—A Honey Man's Opinion

To the Editor of "Food Industries":

For three years corn sugar has been an important issue with United States honey producers. One of our bee-keepers' trade papers commenced the fight against corn sugar legislation, and the other bee journal, after first publishing an opinion declaring the corn sugar bills to be in no way antagonistic to the interests of the honey industry, finally capitulated and urged its opposition. For almost three years our honey men have been subjected to a steady bombardment of propaganda which has created in their minds the belief that corn sugar is a menace to their industry and hence something that should be vigorously opposed.

This preliminary statement is made because the honey people, of whom I am one, have exerted a most powerful influence in Washington in opposing corn sugar legislation. I have carefully studied both sides of the matter and as a result I take sharp issue with my own people for the stand they have taken.

First let me say that from the beginning of this fight waged against corn sugar, I have held the same opinion as I do today. About a year ago I set forth my opinions on corn sugar in a letter to my friend the editor of an important bee journal. His reply was immediate. My letter must have stunned him. He could not see how any reasonable man in his senses could be anything but opposed to the corn sugar issue, and in so many words he told me so. I have never questioned this man's sincerity, although his arguments against corn sugar in his bee journal and before the committee in Washington that conducted a hearing on this legislation have not impressed me with their logic. My own ardor in furthering the interests of the honey industry is well known to New York beekeepers and perhaps to others. My enthusiasm for honey, and my record of performance in the field of honey publicity, earned for me the chairmanship of the committee on publicity of the American Honey Producers' League. I mention this so that no one will question my own sincerity in setting forth this first favorable corn sugar opinion to appear from the side of the honey people. Remember, too, I make my bread and butter selling honey.

The first effort on behalf of corn sugar was made on March 2, 1926, in the form of identical bills introduced in the interest of the corn growers by Senator Cummins of Iowa and by Representative Cole of Iowa. The Cummins-Cole bill was in form an amendment to the Food and Drugs Act, and was intended to permit the use of pure corn sugar (dextrose) and levulose for the sweetening of food products without declaration on the labels of the products so sweetened.

At the time I was extension specialist in apiculture at Cornell University. Our first intimation of the existence of the bill came in the form of a violent warning that the bill had already passed the Senate, and that unless all concerned took immediate and determined action the honey industry would be ruined, because this proposed amendment would permit honey to be adulterated with corn sugar, and then we would be plunged back to the dark days before June 30, 1906, when the pure food law was enacted.

That frenzied communication is typical of the various conclusions that have been jumped at by certain leaders among our honey people. One can go to any library, get out the Food and Drugs Act and note that the system of purely arbitrary standards and definitions under which that law is administered, although not provided for in the law, permits *cane sugar* to be used to sweeten and preserve foods without declaration on the label. Has anyone ever tried to use cane sugar to adulterate honey on the basis of these now prevailing standards? Of course no one ever has. Yet this wild claim was made that with this amendment passed corn sugar could be used to adulterate honey and the mixture could be sold legally as honey. To assume that the proposed amendment would nullify all that the law positively sets forth as to what constitutes adulteration and legalize the sale of honey mixed with corn sugar as honey, was absurd—nothing short of it.

The opposition of the beekeepers helped to prevent the enactment of the Cummins-Cole bill. At the following session of Congress on January 25, 1928, new bills known as the Capper-Cole bills (Senator Cummins having died in the interim) were introduced. The Capper-Cole bill was not framed as an amendment to the Food and Drugs Act, following rather the lines of the law defining butter, and providing that dextrose—a sugar derived from corn, and levulose—a sugar derived from Jerusalem artichokes, shall not be deemed misbranded if sold or offered for sale in sealed packages bearing an appropriate, accurate, and conspicuous declaration of the origin of the sugar. In other words, it is specifically provided that these sugars shall not be sold as "sugar." The bill further provides "Nor shall any manufactured or prepared food product be deemed misbranded if such dextrose and/or levulose be used therein as ingredients without declaration on the label of their presence." In addition, there was added a special proviso to meet the objection of the beekeepers, to wit: "That nothing in this act shall be deemed to permit the insertion of dextrose and/or levulose by mixing or blending in any article of food sold or offered for sale as honey."

Honey was clearly without the scope of possible adulteration, but our devoted guardians among the honey folk were still suspicious. The argument now was that this requested change was aimed straight at the integrity of the pure food law, that to permit this change would establish a precedent that would tear down the whole structure of that law and the endless good it has done our country. Further than this, it would be rank deception to permit things to be sweetened with corn sugar; that the public has a right to know if something other than cane sugar is used. As to this point, the consuming public has been educated to believe that special labeling indicates the presence of something harmful, inferior—as for instance, saccharin, or a habit-forming drug—and hence refuses to buy a product labeled "sweetened with dextrose" or "sweetened with corn sugar," even though such a product would be just as wholesome and more readily digested.

The manufacturers of corn sugar have consulted with those who would use corn sugar if it could be used without declaration on labels and have found that food packers and manufacturers would not risk the success of their business on such special declaration as the regulations now require. Consequently the corn sugar people feel that in spite of the one hundred per cent wholesomeness of the sugar, they are being discriminated against. I feel the same way about it.

Bear in mind, the requested change includes levulose, the largest single ingredient of honey, perhaps the best of all sugars—as far as science knows, the most wholesome sugar. Much sweeter than cane sugar and the only sugar safe for diabetics, this sugar must also go under the ban if the bill is not passed. Levulose is just as queer looking and meaningless on a label as dextrose, or sucrose, for that matter, the only one the public knows as sugar.

"But," say the opposition, other than beekeepers, "there are other arguments against permitting this change in the regulation. Corn sugar is not as sweet as cane sugar and therefore will not do its work." Granted. Dextrose cannot be substituted pound for pound for sucrose; nor does anyone interested in the sale of corn sugar make any such false claims for this member of the sugar family. In this connection I am reminded of the highly ludicrous presentment made by a representative of certain jam and jelly packers before

the last congressional hearing on corn sugar. This gentleman claimed that if corn sugar were substituted for cane sugar, such jams and jellies would be made in such fashion as to ruin the industry completely. Such an argument gets us nowhere. It must be conceded that legislation favorable to corn sugar will not compel anyone to ruin his product by forcing him to substitute corn sugar for cane sugar, pound for pound. The first people to guard against such a thing would be the corn sugar manufacturers themselves, who are not in business for this year only or interested solely in immediate profits. They plan to be in business for all time and have carefully experimented to find out how corn sugar will improve the products in which it can be used, with the result that they have recommendations for the proper use of their sugar all ready for those who may wish to use it.

Now let us investigate the present status of corn sugar in commerce. The use of corn sugar, without any label declaration whatever, is permitted in the following products by those who are charged with the enforcement of our federal pure food law: bread, cakes, pies, candies, and other confections and cured meats. Corn sugar is so much better than cane sugar for sweetening ice cream that its use has become general, and now through custom its use in ice cream is considered legitimate.

It is obvious that there is no deception in these instances of the legalized use of corn sugar in common foods which we consume every day; and yet some folks would have us believe that it would be rank deception to extend the use of corn sugar to the sweetening of jams, jellies, preserves, canned fruits and vegetables, beverages, catsup, and pickles. There is no room for argument here: either this is consistent or inconsistent; either this is discrimination or it isn't.

The terms "deception" and "a blow at the integrity of the pure food law" have become catch phrases, and they make it sound so bad that others besides the beekeepers and the competitors of the corn sugar people have taken them up. A careful study of the issue has led me to conclude that science, logic and justice are on the side of corn sugar, and I trust that more people will interest themselves in it and let their opinions be heard.

New York. R. B. WILLSON.

MANUFACTURERS' · NEWS · AND · EQUIPMENT

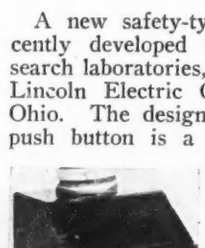
Cherry Pit Products

The Fruit Products Company, Inc., Sturgeon Bay, Wis., is manufacturing cherry-seed oil, cherry shells, and press cake from cherry pits. Cherry-seed oil is of the general character of almond oil and finds its use principally in the pharmaceutical and cosmetic industry. The oil is cold pressed, refined, and shipped in 5-gal. cans. Samples of the press cake, meal, and crude and refined oil were on display.

Figures furnished by the Fruit Products Company are of interest. In Michigan, New York, and Wisconsin approximately 100,000,000 lb. of cherries are canned yearly, all of which must be pitted. The pits amount to 12 per cent of the total weight. One ton of wet pits produces 12 gal. of crude cherry-seed oil.

Safety Push Button

A new safety-type push button, recently developed by the Lincoln research laboratories, is announced by the Lincoln Electric Company, Cleveland, Ohio. The design of this new safety push button is a departure from the usual type of push-button switch design to the extent that it offers unusual safety features. A ball-top "start" button is contained inside a large "stop" button, which projects over the "start" button. Thus the large projecting "stop" button protects the "start" button from accidental contact. The "start" button can only be operated by the tip of a thumb or finger inserted inside the "stop" button. The "stop" button can be operated by a finger or palm of the hand. The colors of push buttons are in accordance with the accepted standard signal colors for controlling railroad, vehicular, and pedestrian traffic. The "start" button is of vivid green molded Bakelite with the word START in white letters across the ball-top face of the button. The surrounding "stop" button is of brilliant red molded Bakelite.



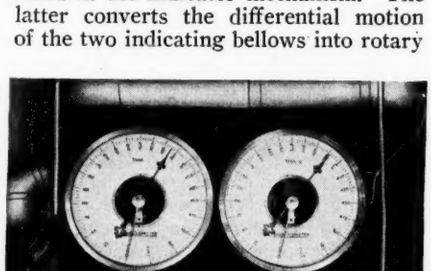
Wide Mouth Glass Jars

To obviate the use of tongs, or the so-called stick pack, in placing pickles in glass jars, the Illinois Glass Company, Alton, Ill., has developed a wide mouth jar adapted to take an 89-mm. cap. The opening is wide enough to admit the average hand. Not only does it permit lower packing costs, but also it enhances the ease with which the consumer may remove the pickles.

Remote Liquid-Level Gage

A product recently introduced by the Liquidometer Corporation, Skillman Ave. and Hulst St., Long Island City, N. Y., is a distant-reading tank gage made in a number of different models. This gage employs a float consisting of a cylinder, long in proportion to its diameter, pivoted at its center point. This is mounted on the end of an arm which is pivoted at a fixed point, midway between the possible upper and lower levels of the tank liquid. A linkage, connecting with the arm, greatly reduces the motion of the float and communicates it to a balanced hydraulic transmission. The latter is one of the principal features of the device and to it is credited largely the instrument's ability to give accurate results at a distance up to several hundred feet from the tank.

The transmission consists of two pairs of metal bellows, each pair connected by small copper lines filled with a non-compressible liquid. Two bellows are located at the tank and the other two, connected by the copper lines to the first, within the indicating or recording instrument. Any motion of the float expands one bellows while it compresses the other at the transmitting end by an equal amount so that the corresponding pair of bellows in the indicator reflect the change. Any change in the volume of the transmission fluid due to temperature variation is ingeniously compensated in the indicator mechanism. The latter converts the differential motion of the two indicating bellows into rotary motion of the indicating pointer which moves on the face of the instrument. Through the use of the dual transmission systems, motion of the pointer is positive in both directions, and an increase of pressure in one system is



Installation of "12-In. Senior" Liquidometers

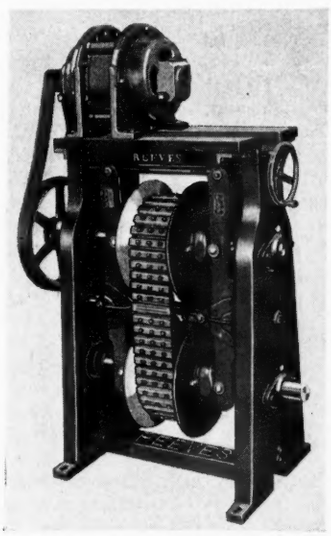
balanced by a decrease of pressure in the other.

Industrial liquidometers are provided in a number of sizes, all of which use the same mechanism but provide different dial faces and types of cases. Sizes range from a 24-in. dial indicator to an industrial type with a total pointer travel of 10 in. The same mechanism is installed in two models of recording gages.

Two models of direct-reading gages employ a number of the same features. Instead of using the hydraulic transmission, however, motion of the float is communicated directly through a flexible metal bellows to the indicating mechanism. One model is a vertical-reading and the other is a flush horizontal type.

Vertical Variable Speed Transmission

A vertical model of the better known horizontal variable speed transmission is a recent offering of the Reeves Pulley



Company, of Columbus, Ind. It is designed to conserve floor or ceiling space, or for use where a vertical unit will fit into a machine better than the horizontal type. In the illustration it is shown equipped with a motor base, but it can be provided either with or without this feature. The shifting screw, which regulates speed, is located optionally at either top or bottom.

Rubber-Mounted Motors

Wagner Electric Corporation, of St. Louis, Mo., announces a new rubber-mounted motor, the 57RA, a new development in refrigeration motor design.

The motor proper is completely insulated from the supporting cradle-shaped base by rubber bushings, effecting exceptional quiet. Notwithstanding the use of rubber to absorb the minimum amount of vibration produced in the motor, the entire outfit is practically rigid, and shaft alignment is in no way endangered.

Do Not Neglect Control Instruments

PREPARATORY to the summer campaigns, at this time of the year a great deal of overhauling will commence in plants of various types—particularly those devoted to the sugar refining, canning and preserving, and other seasonal industries. This overhauling will consist largely of reconditioning and repair of major equipment, or process equipment. Bearings will be rebabbitted, kettles retinned, new piping installed; valves must be reground or equipped with new disks; pumps may need new hydraulic packing; chains and conveyors will require replacement of worn parts; new machinery will need installing and connecting; boilers may want retubing or patching.

Instruments Must Be Accurate

No matter how well built or well designed process equipment may be, however, it is well known that the best results can be obtained only with the aid of a class of modest, tireless, silent, uncomplaining workers—the industrial instruments such as gages, thermometers, or automatic controllers which either indicate pressure or temperature or automatically control these conditions.

It is most important at this time to test all instruments for accuracy. Thermometers should be unscrewed from their locations and brought to a temporary "laboratory," where their reading may be compared with those of a certified standard thermometer. This is best accomplished by immersing their bulbs in boiling water or in a hot oil whose temperature may be maintained steadily at some point above the boiling point of water, such as 240 deg. F. The standard thermometer is preferably an etched stem laboratory thermometer of suitable length. Usually these are obtainable in 12-, 15-, and 18-in. lengths, the longer ones, for the most part, being better adapted to this work than the shorter. Care must be taken to insure that the liquid in which the thermometers are compared is constantly agitated or stirred, so that all will be exposed to identical conditions.

Thermometers should be inspected for physical defects and carefully cleaned. Any found broken or otherwise unserviceable should be returned to the makers for repairs. It is highly important to allow ample time for repairs to be made and the equipment returned.

The pointers of gages, particularly steam pressure gages on boilers or other hot locations, occasionally need resetting. A gage contains moving parts, and when its action becomes jerky, or sluggish, a drop of oil on its bearings will usually relieve the condition.

Self-contained automatic controllers for pressure or temperature seldom get out of order, but it is well to make sure that they are clean. A competent steamfitter should inspect the valves which they operate.

Dirt Causes Trouble

When the control system does not function properly, it has been found that automatic controllers employing compressed air as an auxiliary force are seldom if ever at fault. When the system as a whole behaves irregularly, the controller instrument, which is an integral part, is less likely to be at fault than some other part. The chances of locating the trouble in the instrument itself are about one in a thousand. Generally, any troubles are likely to be caused by dirt in the air lines, a condition which is promptly corrected by blowing them out for several minutes. Strainers and filters cannot serve effectively when the air lines are badly fouled. Compressed air should be delivered to the controllers uniformly at the pressure specified by the instrument maker, and it should be free from moisture, oil, or dirt. When in use, petcocks should be blown daily and strainers cleaned once a month by washing the inner mesh tube and wick with gasoline. Air compressors and air pressure-reducing valves should also receive attention when checking over the controller systems.

If previous suggestions are carried out, the diaphragm-motor valves will have been inspected by a steamfitter, but the man in charge of instruments should also inspect their tops and adjust their springs.

These humble workers, the watchful instruments, have an important job to perform, and should be encouraged—not neglected. Each instrument is an investment which pays big dividends when it is in good condition. Keep it healthy!

Wagner Rubber-Mounted Motor

Change in Product Trade Name Announced

The Magnetic Manufacturing Company, Milwaukee, manufacturers of high duty magnetic separators, magnetic clutches, and special magnetic equipment, announces that its products will bear the trade name "Stearns" in addition to "High Duty." This action was prompted by the need for a more specific identification of its products. The new designation is derived from the names of company officers.

· NEWS · ITEMS ·

Grocery Executives' Louisville Conference

A preliminary report on the food distribution survey recently conducted at Louisville by the Department of Commerce was presented before the National Conference of Executives of the Grocery Industry in that city February 25-26, in which all phases of food distribution in all parts of the country were represented.

Among the speakers were William B. Harrison, Mayor of Louisville; Frank M. Surface and J. W. Millard of the U. S. Department of Commerce; Carl Dipman, Editor, *The Progressive Grocer;* Richard Bean, President, Louisville National Bank & Trust Company; Shirly E. Hass, Secretary, Louisville Retail Grocers Association; William Butterworth, President, U. S. Chamber of Commerce; O. H. Cheyney, Vice-president, Irving Trust Company, New York; Sydney Anderson, President, Millers National Federation; and John Coode, President, National Retail Grocers Association.

The report showed, among other things, states *Domestic Commerce,* in its review of the conference, that the inefficient methods of numerous Louisville retailers, disclosed by the survey, are common to many grocers all over the country who are following the same methods because of a lack of precise knowledge of what they are doing and of the effects of their methods of operation. Knowledge of what the consumer requires, also knowledge of in what quantities, when, and where would enable goods to flow faster and more steadily, and result in all concerned being better paid for their services while selling at a lower level.

So important and far reaching were felt to be the results of the Louisville survey that the Conference adopted a resolution to provide for the application of its results to actual practice. This resolution called for the appointment of a committee to confer with a committee to be appointed by the Secretary of Commerce, to study and report to an adjourned meeting of the conference (to be called as soon as possible after the completion of the Louisville survey) upon the following points:

1. The need for other Surveys of similar or related nature

2. The best means of applying the results of the survey to Louisville business

3. The best means of extending these surveys to national problems

The conference committee appointed to carry on the work along the lines indicated was composed of H. R. Drackett, President, American Wholesale Grocers Association, Cincinnati, Ohio; Sydney Anderson, President, Millers' National Federation, Washington, D. C.; John Coode, President, National Retail Grocers Association, Crone & Jackson Co., Nashville, Tenn.; W. R. Roach, Grand Rapids, Mich., and National Canners Association, Washington, D. C.; T. F. Branham, Eau Claire Grocer Co., Eau Claire, Wis.; J. H. McLaurin; and Shirley Haas, Secretary, Retail Grocers Association, Louisville.

General Mills Has Large Capacity

Formed in July, 1928, to take over the business and properties of Washburn Crosby Company and four other concerns, General Mills now has a flour milling capacity of 87,700 barrels a day, in 21 mills; 30,463,000 bushels terminal grain storage capacity; 219 country elevators with a capacity of 10,524,000 bushels; seven proprietary feed mills; three cereal food products mills and 74 branch offices and warehouses in the United States.

COMING EVENTS

APRIL

3-4—Tri-State Packers Association, Inc. Baltimore.
15–17—Rocky Mountain Bakers Association, Denver.
16-17—Associated Bakers of Illinois, Joliet.
17–18—Ohio State Millers Association, Columbus.
20 —Association of Operative Millers, Joint Meeting of Kansas City and Wichita Districts, Manhattan, Kan.
26–27—National Wholesale Conference U. S. Chamber of Commerce, Washington, D. C.
28–1—Texas Bakers Association, Dallas.
29–3—American Chemical Society, Columbus, Ohio.

MAY

5–7—Southern Bakers Association, New Orleans.
6–8—Associated Bakers of America, Buffalo.
6–10—Annual Convention American Association of Cereal Chemists.
6–11—Exposition of Chemical Industries.
13–14—New York Association of Manufacturing Retail Bakers, Buffalo.
14–16—Iowa Bakers Association, Cedar Rapids.
16–18—Nebraska Bakers Association, Omaha.
19–21—New England Bakers Association, Swampscott, Mass.
20–22—Missouri Master Bakers Association, Kansas City, Mo.

JUNE

3–8—Association of Operative Millers St. Louis.
10–12—Pennsylvania Bakers Association, Bedford Springs.
17–19—Potomac States Bakers Association, Virginia Beach, Va.
17–19—Associated Bakers of Minnesota, St. Paul.
18–20—National Macaroni Association, New York.

"Aviation" Joins McGraw-Hill Group

By purchasing *Aviation,* the oldest aeronautical magazine in the United States, the publishers of *Food Industries* extend their service and influence into a new industry that is rapidly becoming of basic importance. This weekly magazine, which was established more than twelve years ago by Major Lester D. Gardner, is devoted to the broad field of aviation in all of its phases.

A direction in which aviation is developing, and which is of particular interest to the food industries, is the use of the plane as a transportation medium. "In 1928," according to a statement made public by James H. McGraw, Chairman of the Board of the McGraw-Hill Publishing Company, "there were sixty-six nationally known business organizations using one or more planes in their normal, every-day business operations. The list is growing." "In the air mail service alone," continued Mr. McGraw, "there is convincing proof of the great progress already accomplished and the greater transportation triumphs to be achieved by the air plane in the future. One line carrying the United States mails through the highways of the air estimates that it will do a $1,500,000 business in 1929."

As *Aviation* joins the McGraw-Hill group of 25 industrial, engineering, and business publications, it will draw support from the greater engineering and publishing resources of the McGraw-Hill organization. Thus, *Engineering News-Record* has contributed to airport construction, *Electrical World* to the lighting and control of airways, *Chemical & Metallurgical Engineering* to alloy manufacture, painting problems, lubrication, and motor fuel.

Referring to this extension of publishing service, Mr. McGraw said, "We assume the publishing direction of *Aviation* with the conviction that the resources of the McGraw-Hill organization will bring new strength to this paper and practical benefit to the industry beyond the reach of a single publication. We enter this field only because it is clear that there is an opportunity to render service that will advance the art of flying and its economic development."

MonoService Company Denies Merger Rumors

Current reports to the effect that MonoService, Newark, N. J., paper container manufacturers is about to be acquired are denied by general manager Elbert Beeman.

Smoot-Hawley Bill May Not Effect Farm Relief

Author of New Tariff Measure Believes Present Economic Situation Calls for Specific Legislation

By Paul Wooton
Washington Correspondent

ALTHOUGH increased tariff rates on almost every sort of foodstuff and agricultural commodity were asked by witnesses appearing on behalf of the farm group before the ways and means committee, it is becoming more and more apparent that the pending farm relief measures will not be undertaken generally through the tariff structure. The committee's chairman, Willis C. Hawley, is quoted as saying, "When surpluses occur in the American market, as is now the case in agriculture, provision for their disposal should be effected by legislation independent of the tariff."

Beyond such statements of policy, no specific information will be available until the bill is reported. The Republican subcommittees are in session behind closed doors with the purpose of completing their work shortly after April 15 when the new Congress convenes. It has been predicted that the bill will pass the House before the end of May and will become law by July.

There is no reason to believe that the minority party will deviate materially from its stand against high protective duties. On the farm problem, Democratic leaders have expressed themselves as fully in sympathy with some measure of relief. In accordance with this idea and consistent with their old tariff policies, they have stated that they do not believe in a high tariff but feel that agriculture should receive protection equal to that given other industries. The fallacy of extending protection to export commodities as well as the few products subject to serious foreign competition is, however, fully realized.

Milling in Bond Discussed

The drawback and milling in bond provisions of the Fordney-McCumber Act, whereby wheat may be imported duty-free for export trade, were attacked in the tariff hearings by interests hoping to displace Canadian wheat from the Cuban market. Since the passage of the act a large milling business has sprung up in Buffalo where Canadian wheat may economically be delivered and shipped out as flour by water routes. In 1927 two and one-half million bbl. of flour were so milled and exported. Most of this flour goes to the tropics, principally Cuba, as the gluten of wheat grown in northern latitudes is said to stand up better in a hot climate than do products of the United States wheat belt. Millers and growers of the southwestern states contend, however, that they are nearer the ultimate consumer and that their products should have the market in preference to Canadian wheat; therefore they urge the repeal of the milling in bond privilege.

Import millers answer that this would ruin their business in favor of Canadian competitors without benefiting United States interests. Not enough Canadian type wheat is being raised in this country to fill the export demand, it is pointed out. Figures were cited to show that Canadian mills would be able to undersell if milling in bond is discontinued. Millers in the United States now have a slight advantage in the Cuban market because of the preferential duty, it compensating for lower Canadian costs, it was stated. That Cuba would accept the type of flour ground in southern mills was denied. The repeal of the milling in bond provision is generally thought to be unlikely in the coming tariff bill.

New Treaty with Cuba Proposed

A proposal from Cuba, regarded as revolutionary in official circles here, contemplates a new commercial treaty with that republic, replacing the existing treaty of 1903. Since the receipt of the Cuban Ambassador's communication in December, 1927, the matter has been under discussion by the State Department. One of Secretary Kellogg's last official acts was his placing the file of correspondence in regard thereto before the ways and means committee, because of its bearing upon tariff rates.

Briefly, the Cuban government proposes to increase by about one-half the present preferential tariff rates on all American products entering Cuba:

Abolish the present Cuban tariff, ranging from 8 to 20 per cent advalorem, on many American manufactures, including electrical goods, automobiles, engines, pumps, agricultural machinery and aircraft; and on wheat, rye, barley, oats, fruits, clover and other seeds, cotton and feed, present rates on which vary from 32c. to $1.60 per quintal (220 lb.).

In exchange for these benefits Cuba asks that the American tariff on Cuban sugar be reduced from 1.76c. a lb. to about 1.32c. a lb.; that an arrangement be made under which the tariff on a certain amount of Cuban sugar (tentatively suggested at 3,300,000 tons) imported annually by the United States be lowered gradually over a period of about nine and one-half years until it is finally wiped out altogether; that the American government restrict to 300,000 tons a year the amount of sugar to be imported into the United States duty-free from the Philippines.

Full protection against competition in Cuban markets is offered American farmers and manufacturers inasmuch as the Cuban government proposes to retain its present tariffs upon shipments from all other countries, lifting the tariff only in the case of shipments from America.

How much this action would increase the buying power of the Cuban people is yet to be determined. It has been estimated at $10 per capita, thereby creating an additional market for about $36,000,000 worth of American goods. Need for extension of the American market in Cuba is urged by citing the dwindling figures of Cuban purchases, which were in 1920 about $515,000,000 worth of American goods as contrasted with $125,000,000 in 1927.

Food Manufacturers' Purchases Analyzed at Cleveland

That raw materials and semi-finished products constitute ninety-three per cent of the value of purchases by food manufacturers is indicated by tentative results of the Commerce Department's industrial distribution survey being conducted in Cleveland. The remaining three per cent is represented by power and fuel used in production, office equipment, and other goods necessarily included in the cost of the product. Data for the phase of the work relating to food industries was obtained from 107 manufacturers of food and kindred products in the Cleveland area, the purpose in mind being possible amplification to this extent of the distribution survey.

Protein Testing Laboratories a Likely Possibility

Legislation authorizing the establishment of laboratories for making official tests of the protein in wheat, succeeded in getting through the Senate but was held up in the House of Representatives by the last minute jam of important bills. Because of the failure of the lower house to act a new bill must necessarily be introduced, inasmuch as all bills unacted upon lost their status when Congress adjourns.

The bill, introduced into the Senate by Senator Walsh of Montana, seeks to authorize the Secretary of Agriculture to establish protein testing laboratories in co-operation with state agricultural colleges. The bill further provides that these laboratories shall make studies of the wheat each year before the harvesting season and disseminate estimates based on such tests of the probable amount of protein in the wheat in any given area.

To make the venture self-supporting, it was proposed to charge a laboratory fee for the testing service. An appropriation of $285,000 was provided to get the work started. In reports sent to the Senate Agricultural Committee, the Department of Agriculture was represented as being "heartily in favor of the legislation." The Senate report on the bill brings out that under the present system of testing, farmers do not receive due value for the protein content of their wheat.

Birth of Quaker Maid

The A. & P. Products Corporation, with executive offices in the Graybar Building, New York, and having factories in Brooklyn and Brockport, N. Y., announces that after March 4 the name of the corporation will be The Quaker Maid Company, Inc., a subsidiary of the Great Atlantic & Pacific Tea Company.

Old Age Pensions for American Chicle

Elderly employees of American Chicle Company are to receive pensions under a new bond pension system, using the principle of a deferred life annuity, according to a recent announcement of T. H. Blodgett, president. The system, worked out by Social Engineering Institute, Inc., and underwritten by Equitable Life, is the result of five years of research.

A Single Objection Holds Up Canners Bill

Objection by Senator Royal S. Copeland, of New York, to consideration of the McNary-Mapes bill—the Canners' Substandard Labelling Bill (S.4800-H.R. 15,218)—on the night of February 27 made it necessary, under the unanimous consent rule in the Senate to pass it by, although it had passed the House on February 25. A recess of the Senate shortly afterward prevented its further consideration and Congress adjourned without enacting it. Senator Copeland is in favor of the bill, it is understood, but desired to add an amendment.

The favorable consideration given the bill in the House and its prompt passage would indicate that in the future when it can be again presented to Congress its passage will be quite likely.

Continental Can Company's Research Department Moves Into New Quarters

To provide room for an enlarged department, and for the installation of a new canning room for the handling of customer problems the research department of Continental Can Company, Inc., has recently moved into new quarters at 4633 West Grand Avenue, Chicago. The department is organized in four sections: experimental canning, bacteriological, analytical and development.

The experimental canning section, occupying a large portion of the floor space, equipped with many types of double seaming machines is a laboratory on a commercial scale. Steam kettles; accurately, automatically controlled retorts; and a continuous pressure cooker, loaned by the Anderson Barngrover Manufacturing Company, under conditions closely approximating those of commercial practice. Ageing and incubation rooms permit observation of experimental packs under normal and severe summer conditions, to gain an accelerated experience from which it is possible to predict in advance the behavior of goods under probable trade conditions.

The bacteriological section and the chemical section are equipped for the study of problems of canning and container manufacture that may arise in these fields. Devoted largely to can-making problems, in contrast to principal uses of the other sections which are largely for the solution of customers' problems, is the development section for experimental can-manufacture.

Postum Acquires Certo

Another unit will be added to its long list of national successes when the Postum Company, acquires the Certo Corporation, of Rochester and Fairport, N. Y. Postum shareholders ratified the agreement on March 14 and a special meeting of Certo shareholders has been called for April 4 for the same purpose.

Postum has increased authorized stock from 5,000,000 to 6,000,000 shares, and will exchange 351,000 shares for the Certo stock on the basis of 87¾ shares for each 100 shares of Postum, of which there are 400,000 shares outstanding.

Certo will pay its present shareholders a special dividend of $1 in addition to the regular 75 per cent dividend recently authorized by the directors before the deal is consummated. Rumors of the impending merger appeared very shortly after the close of the patent infringement litigation between Certo and Armour in which Certo was victor.

Gold Dust Acquires Control of Standard Milling Company

Despite the efforts of F. L. Rodewald, vice-president and director of Standard Milling Company, and a large holder of its preferred stock, to oppose the transaction, more than 51 per cent of the common shares of the Standard company have been deposited with the Equitable Trust Company as assenting to the offer of the Gold Dust Corporation to exchange its securities for those of the Standard Milling Company. George K. Morrow, president of Gold Dust, is also a vice-president of Standard Milling. On Feb. 6 Gold Dust announced that the plan was effective.

Recently the following directors of Standard Milling have been elected: Randolph Catlin, secretary and treasurer of Gold Dust; Wilbur L. Cummings, of Sullivan & Cromwell, also a director of Gold Dust; T. A. Morrow; R. B. Crispell; and B. Browning. They will succeed Henry H. Pierce, of Sullivan & Cromwell, New York attorneys; Francis M. Weld, of White, Weld & Company, New York bankers; J. M. enable it to pack nearly any product Fuller, and J. Lee.

PERSONALS

OSCAR R. ARMSTRONG, formerly of the sales department of the American Sugar Refining Company, became sales manager of the Texas Sugar Refining Company on March 1. The Texas company's contract with American has expired and Texas will now market its own product.

K. G. BAKER, formerly of the Century Electric Company, St. Louis, has joined the sales force of the Wagner Electric Company at their Cincinnati office.

HARRY A. CRONK was elected president of Borden's Farm Products Company, Inc., on March 6, succeeding Patrick A. Fox, who has been president for the past nine years. Mr. Cronk has been with the Borden company since 1902.

ROBERT W. DANIEL, president of the Liberty National Bank & Trust Co., has been elected a director of the Dahlberg Corporation of America, owners of Southern Sugar and Celotex.

PATRICK A. FOX has been promoted from the presidency of Borden's Farm Products, Inc., of New York, to vice-president in charge of fluid milk operations of the parent Borden Company's national chain of dairy companies.

WALTER GODCHAUX, agricultural manager of Godchaux Sugars, Inc., left New Orleans on March 4 for an extended trip through all the cane sugar producing countries of the world. He will be in Java in June to attend the meeting of the International Association of Sugar Cane Technologists.

Ivin's Elects President

Hugh S. Gilhams

Hugh S. Gilhams, who has been vice-president and general manager of J. S. Ivin's Son, Inc., Philadelphia biscuit bakers since 1896, for several years, has been elected president of the company to succeed the late W. Wallace Roberts whose death occurred Feb. 1, 1929.

RALPH S. KENT succeeds the late William B. Ward as president of the Ward Baking Corporation and the Ward Baking Company. Mr. Kent has been the attorney for Mr. Ward for several years.

DR. RALPH E. LEE, director of the Department of Applied Research of The Fleischmann Company, sailed for

Europe on March 20 for a series of conferences with fermentologists in England, Denmark, Berlin, Vienna and Paris. He will be gone about two months.

LATHAM R. REED, of E. A. Pierce & Company, was elected a director of American Sugar Refining Company.

ARTHUR H. ROSENFELD, consulting technologist of the American Sugar Cane League will attend the meeting of the International Association of Sugar Cane Technologists to be held in Java in June.

JAMES C. STEWART was elected a director of the Continental Baking Corporation at a recent stockholders' meeting.

L. M. TOLMAN has been appointed as general manager of the Research and Technical Department of Wilson & Company, in which capacity he will act as consultant on methods, processes and new developments of all Wilson & Company plants and subsidiaries, including Ucopco and Central Chemical Company. F. W. Kirk continues in charge of the laboratories.

L. W. WALTHER has resigned from the engineering department of the National Biscuit Company to join the consulting engineering staff of Abbott Dairies, Inc., Philadelphia, Pa.

OBITUARY

ASA GRIGGS CANDLER, 77, founder of the Coca-Cola business, died March 12 at the Wesley Memorial Hospital, Atlanta, in which he had been a patient since 1926. He began making the well-known beverage in 1888, with sales of only 500 gallons in the first year. In 1892 he founded the Coca Cola Company of Georgia and continued as its active head until 1911, when he was succeeded by his son Charles Howard Candler. The business was sold in September, 1919, to the Coca Cola Company of Delaware for $25,000,000.

WILLIAM B. KELLER, founder and editor of The National Bottlers' Gazette died suddenly at his home in New York City on March 6.

FREDERICK A. LOHMEYER, president of the Confection Products, Inc., of Jersey City, N. J., died of heart disease on a train near Altoona, Pa., on February 27.

THEODORE F. MERSELES, 65, of Bronxville, N. Y., president of Johns-Manville, Inc., for the past two years, died of heart disease at Del Monte, Cal., on March 6. He was one of the great merchandizers and business organizers of the country. From 1903 to 1921 he built up the National Cloak and Suit Company business from $1,000,000 to $50,000,000 annually. In 1921 J. P. Morgan and Company placed him in the presidency of Montgomery Ward & Co. to guide that concern out of its post-war difficulties. He remained there till 1927 when the house of Morgan again called him to head Johns-Manville, Inc. In each case the companies have prospered under his direction.

WALTER J. SEARS, 60, twelfth president of the National Canners Association, died February 13 at the City Hospital, Chillicothe, Ohio, following a surgical operation. He was president of Sears & Nichols Canning Company, of Chillicothe, Ohio, during the war years, president of the Canners Association in 1920, and was at one time heavily interested in Sears & Simpson Printing Company, of Columbus. When a receiver was appointed for Sears & Nichols he withdrew from the canning business and entered the brokerage business. At the time of his death he was a member of the Sears-Derr Co., manufacturers of syrups and flavoring extracts.

WILLIAM R. SUHRE, 60, retired president and treasurer of Rudolph Suhre Sons Company, Cincinnati canners, died at the Good Samaritan Hospital in that city, after a long illness.

C. S. WINCHESTER, 74, founder of the Winchester Packing Company, Hutchinson (Kansas) meat packers, died recently in that city.

· NEW · CONSTRUCTION ·

Factory and Equipment Requirements

Abattoir Building—City of Temple, Tex., will soon award contract for a 1 story, 48 x 80 ft. abattoir building. G. E. Byars is city manager.

Bake Shop—Metropolitan Macaroni Mfg. Co., J. Busalmi, Pres., Brooklyn, N. Y., plans a 2 story, 37 x 96 ft. bake shop at Waterbury and Ten Eyck Sts. Estimated cost $40,000. C. P. Cannella, 1163 Herkimer St., Brooklyn, is architect. Work will be done by separate contracts.

Baking Plant—M. Chesney, c/o S. Cohen, 134 Branford Pl., Newark, N. J., Archt., is receiving bids for a 2 story, 45 x 100 ft. baking plant at Jersey St. and Manor Ave. Estimated cost $40,000.

Bakery — Barker's Bread Ltd., 285 Spadina Ave., Toronto, Ont., is having plans prepared for a 2 or 3 story, 80 x 100 ft. bakery at Fleet and Bathurst Sts. Estimated cost $300,000.

Bakery—F. Jaeger, 915 Bergenline Ave., Union City, N. J., will soon award contract for a 2 story, 25 x 100 ft. bakery. Estimated cost $40,000. C. G. Eicholz, Jr., 960 Bergenline Ave., Union City, N. J., is architect.

Bakery Addition—J. Spang Baking Co., H. Spang, Pres., 1566 East 24th St., Cleveland, O., plans a 1 and 2 story addition to bakery at Lorain. Estimated cost $50,000. G. S. Rider Co., Century Bldg., Cleveland, Archt.

Bottling Plant — Be-Well Water Corp., 308 North Oxford St., Los Angeles, Calif., is having plans prepared for a 1 story, 100 x 265 ft. bottling plant at Oxford St. and Beverly Blvd. C. Lindbom, 1338 Warener Ave., Westgate, Archt.

Bottling Plant — Sparkletts Artesian Water Corp., 4500 York Blvd., Los Angeles, Calif., is having plans prepared for a 1 and 2 story, 125 x 610 ft. bottling plant. Estimated cost $100,000. R. D. King, Van Nuys Bldg., Los Angeles, is architect.

Bottling Plant Addition—Bacon Bottling Works, 43 Morris St., Hartford, Conn., awarded contract for a 2 story addition to bottling plant to S. Martin, 107 Love Lane, Hartford. Estimated cost $40,000.

Bottling Plant—Coca-Cola Bottling Co., T. L. Bellingrath, 615 East Markham St., Little Rock, Ark., will soon award contract for the construction of a bottling plant at Morrilton, Ark. Estimated cost $75,000. Thompson, Sanders & Ginocchio, Hall Bldg., Little Rock, are architects.

Candy Factory—Mars Inc., 2025 North Oak Park Ave., Chicago, Ill., awarded contract for addition to candy factory to Austin Co., 16112 Euclid Ave., Cleveland, O. Estimated cost $75,000.

Cracker and Candy Factory — Brown Cracker & Candy Co., 603 Caruth St., Dallas, Tex. and Loose-Wiles Biscuit Co., Thompson Ave., Long Island City, N. Y., plan the construction of a plant at San Antonio, Tex. Estimated cost $250,000.

Cannery (Fish) — F. E. Booth Co., 110 Market St., San Francisco, Calif., awarded contract for a 1 and 3 story fish cannery at Pittsburg to Lindgren & Swinerton Inc., 225 Bush St., San Francisco. Estimated cost $250,000.

Cannery—Filici & Perrelli, Gilroy, Calif., is having plans prepared for a 1 story cannery at 81st Ave. and East 14th St., Oakland. Estimated cost $500,000. W. Knowles, 1214 Webster St., Oakland, Calif., is architect.

Cannery Addition — Harter Packing Co., Yuba City, Calif., has work under way on the construction of a 1 story, 100 x 240 ft. addition to cannery.

Canning Factory—Marshall Canning Co., Marshalltown, Ia., is having preliminary plans prepared for the construction of a 2 story, 100 x 200 ft. canning factory.

Canning Plant and Warehouse—City of Oakland, Calif., plans the construction of a canning plant and warehouse at 14th St. Estimated cost $250,000. Libby, McNeil & Libby, Merchants Exchange Bldg., San Francisco, are lessees.

Canning Plant — Sutter Co-Operative Growers, 16 California St., San Francisco, Calif., is having plans prepared for the construction of a canning plant at Oakland. Estimated cost $150,000. Austin Co., Russ Bldg., San Francisco, is architect.

Canning Plant—Tyrrell & Garth Investment Co., Beaumont, Tex., will build a 1 story, 60 x 210 ft. canning plant. Estimated cost $60,000. Work will be done by day labor.

Canning and Packing — Reid-Murdock Co., Clark Street Bridge, Chicago, Ill., awarded contract for a 127 x 380 ft. canning and packing plant at Rochester Minn., to G. Schwartz & Co., Rochester. Estimated cost $100,000.

Chili Factory—Chili Products Corp., 345 East Second St., Los Angeles, Calif., awarded contract for a 2 story, 70 x 169 ft. factory to W. P. Neil Co., 4814 Loma Vista Ave., Los Angeles. Estimated cost $52,000.

Cooking Building—H. J. Heinz Co., R. A. Logan, Local Mgr., Leamington, Ont., is having plans prepared for the construction of a 3 story, 50 x 100 ft. cooking building. Estimated cost $75,000. Private plans. Equipment for cooking and baking the company's products will be required.

Cheese Factory — Don Browning Ranch, Woodland, Calif., awarded contract for the construction of a 1 story, 75 x 100 ft. cheese factory to King Lindale, Woodland. Estimated cost $16,000. Equipment will be installed.

Creamery—J. Butz, Brownsville, Tex., awarded contract for a 2 story, 30 x 80 ft. creamery to E. G. Holliday, Brownsville. Estimated cost $23,000.

Creamery Plant—V. E. Neal, 33 West 5th St., Dayton, O., plans the construc-

tion of a 2 story creamery plant at Ludlow and Apple Sts. Estimated cost $85,000.

Creamery — Red River Creamery Co., Slaton, Tex., is having preliminary plans prepared for the construction of a 1 story creamery at Slaton. Estimated cost including machinery and equipment $32,000. Private plans.

Creamery — Risdon Creamery Co., 6525 Linwood Ave., Detroit, Mich., awarded contract for a 2 story creamery on Linwood Ave. to Krieghoff Co., French Rd., Detroit. Estimated cost $100,000. Owner is in the market for miscellaneous equipment.

Creamery Plant—Valley Sanitary Milk Co., Mercedes, Tex., plans a 2 story, 50 x 100 ft. creamery plant. Estimated cost $50,000. Private plans.

Dairy Plant — Borden Farm Products Co., 110 Hudson St., New York, N. Y., plans the construction of a dairy plant at Mt. Vernon, N. Y. Estimated cost $500,000. Private plans.

Dairy Plant—Page Dairy Co., Wade St., Toledo, O., will receive bids until Apr. 6 for the construction of a dairy plant. Estimated cost $60,000.

Dairy — University of Kentucky, F. L. McVey, Pres., Lexington, Ky., awarded contract fo rthe construction of a dairy building, etc. to J. T. Jackson, Lexington, Ky. Estimated cost $150,000.

Dairy and Ice Cream Plant—Snow Queen Creameries Inc., c/o M. Lovett, Pres., Brownsville, Tex., plans the construction of a dairy and ice cream plant. Estimated cost including machinery and equipment $35,000. Private plans.

Dairy Products Plant—Nickel Plate Development Co., c/o W. J. Bergen, Terminal Tower, Cleveland, O., awarded contract for a 2 story, 50 x 130 ft. dairy products plant at East 37th St. and Croton Ave. to G. A. Rutherford Co., 2725 Prospect Ave., Cleveland. Estimated cost $100,000.

Dairy Distribution Plant—Hansen Dairy Co., 1045 South Wall St., Los Angeles, Calif., is having plans prepared for a 2 story, 115 x 150 ft. distribution plant on Mansfield Ave. C. O. Dale, 1045 South Wall St., Los Angeles, is architect.

Ice Cream Manufacturing Plant—Mitchell Dairy Co., 745 North Ave., Bridgeport, Conn., is having plans prepared for a 2 story, 40 x 65 ft. plant on North Ave. Estimated cost $40,000. McCormick, 121 South Negley Ave., Pittsburgh, Pa., is architect.

Ice Cream Plant—A. C. Hinkle, Monterey, Calif., is having plans prepared for a 1 story, 40 x 90 ft. ice cream plant on Washington St. Estimated cost $40,000. Forden Ice Cream Co., King City, Calif., lessee.

Ice Cream Manufacturing Plant—Mitchell Dairy Co., 745 North Ave., Bridgeport, Conn., awarded contract for a 2 story, 40 x 65 ft. plant to T. J. Pardy Construction Co., 1481 Seaview Ave., Bridgeport. Estimated cost $40,000.

Ice Cream Plant, etc.—New York Eskimo Pie Co., 110 Bridge St., Brooklyn, N. Y., is having plans prepared for addition to ice cream plant, etc. Estimated cost $50,000. J. E. Ross, 25 West 43rd St., New York, N. Y., is architect.

Milk (Condensed) Plant—Borden Co., 350 Madison Ave., New York, N. Y., plans the construction of a condensed milk plant. Estimated cost $200,000. Butter making and dried milk equipment awarded.

Milk Condensery — Lake County Milk Products Corp., c/o A. J. Mazurette, 251 Kearny St., San Francisco, Calif., is having plans prepared for a 1 and 2 story milk condensery at Upper Lake. Estimated cost $125,000.

Milk Distribution Plant — California Dairies Inc., Pasadena, Calif., is receiving bids for a 2 story, 80 x 160 ft. milk distribution plant. Morgan, Walls & Clements, Van Nuys Bldg., Los Angeles, are architects.

Milk Plant — Chamber of Commerce, Tyler, Tex., awarded contract for a 1 story milk plant including machinery and equipment to Campbell & White, Tyler, Tex. Estimated cost $39,000.

Milk Plant—Maryville Milk Co., c/o W. F. Phares, Farmers Trust Co., Maryville, Mo., will soon receive bids for the construction of a 2 story milk plant. Estimated cost $200,000. Douthitt Engineering Co., 100 West Monroe St., Chicago, Ill., is engineer.

Milk Warehouse — Petroleum Milk Co., 832 Arcade Bldg., St. Louis, Mo., awarded contract for a 1 story, 104 x 111 ft. milk warehouse at Neosho, Mo. to Hugg Construction Co., c/o owner.

Milk and Dairy Products Plant—Murphy-Ward Co., 2016 Calumet Ave., Chicago, Ill., have acquired the former street car station at 21st and Dearborn Sts. and plans remodeling and improving for a milk and dairy products plant to include laboratories, etc. Estimated cost $250,000.

Food Products Plant—O. K. Products Co., Allentown, Pa., is having plans prepared for a 3 story food products plant at 199-201 Magazine St. Estimated cost $40,000. Architect not selected.

Alfalfa Meal Mill—A. Hogan and N. P. Anderson, Pueblo, Colo., plan the construction of an alfalfa meal mill at North Vineland. Estimated cost $40,000.

Flake Mill—Southern Cereal Co., B. W. Ernst, Secy. and Treas., 205 Pinson St., Birmingham, Ala., plans the construction of a flake mill at Tarrant City. Estimated cost $100,000.

Macaroni Factory—West Coast Macaroni Mfg. Co., c/o Austin Co., Russ Bldg., San Francisco, Calif., Engr., is having plans prepared for a 2 story factory on 57th Ave. Estimated cost $40,000.

Elevator and Storage Silo — Spencer Kellogg & Sons, 822 Flour Exchange Minneapolis, Minn., awarded contract for the construction of an elevator and storage silo at 25th and University Aves. to James Stewart & Co., 343 South Dearborn St., Chicago, Ill. Estimated cost $300,000.

Grain Elevator—Farmers Grain Co., c/o W. C. DinWiddie, Pres., Tulia, Tex., awarded contract for the construction of a grain elevator, 135,000 bu. capacity at Tulia, Tex. to Southwestern Engineering Co., Tulia. Estimated cost $60,000.

Grain Elevator — General Mills, Inc., Chamber of Commerce Bldg., Minneapolis, Minn., awarded contract for the construction of a grain elevator, 2,000,000 bu. capacity at Enid, Okla., to Edwin Ahlskog, 407 South Dearborn St., Chicago, Ill. Estimated cost $500,000.

Grain Elevator—Ingleheart Bros. Inc., Vincennes, Ind., awarded contract for the construction of a grain elevator, 400,000 bu. capacity to include workhouse, wagon dump, track shed, etc. to James Stewart & Co., 343 South Dearborn St., Chicago, Ill.

Grain Elevator — Pillsbury Flour Mills Co., 302 Metropolitan Life Bldg., Minneapolis, Minn., awarded contract for the construction of a grain elevator, 2,300,000 bu. capacity to Barnett & Record, Flour Exchange Bldg., Minneapolis, Minn.

Grain Storage Silos—Postum Cereal Co., Cliff St., Battle Creek, Mich., is having plans prepared for fifteen grain storage silos, 28 in. in diameter and 110 ft. high on Cliff St. Private plans.

Cold Storage Plant — Dept. of Public Works, Toronto, Ont., plans the installation of a cold storage plant in Ontario Hospital, Kingston. Estimated cost $20,000.

Cold Storage Plant — H. Doerr, 150 Shuttle Meadow Ave., New Britain, Conn., awarded contract for a 2 story, 25 x 70 ft. cold storage plant at Spring and Hartford Sts. to Vater & Crannis, 52 Linden St., New Britain. Estimated cost $40,000.

Ice Manufacturing Plant—Peoples Ice & Fuel Co., Los Grosse, Wis., is having plans prepared for a 1 story, 86 x 130 ft. artificial ice manufacturing plant. C. F. Ringer & Sons, 432 Broadway, Milwaukee, Wis., are architects. Equipment will be required.

Ice Manufacturing Plant—White Ice & Supply Co., c/o W. Clifford, Jr., 293 Morris Ave., Elizabeth, N. J., awarded contract for a 1 story, 85 x 175 ft. ice manufacturing plant at South 7th St. and Elizabeth River. Estimated cost $50,000.

Ice Plant—Consumers Ice & Cold Storage Co., 9th and C Sts., Sacramento, Calif., awarded contract for a 4 story, 50 x 100 ft. addition to ice plant to include 180 ton freezing tank and installation of machinery and equipment to W. W. Williamson, 345 Market St., San Francisco. Estimated cost $225,000.

Ice Plant — Fisher-Churchhill Co., Dedham, Mass., awarded contract for a 1 story artificial ice plant at Dwight St. Estimated cost $40,000. P. A. Hopkins, 45 Bromfield St., Boston, is architect.

Ice Plant—E. Hill, Tradesmen's National Bank Bldg., Oklahoma City, Okla., will build a 2 story ice plant at Maud, Okla. Estimated cost $40,000. Work will be done by day labor.

Ice Plant — Kennemer Bros., 4901 Cole St., Dallas, Tex., awarded contract for a 25 ton ice plant at Corsicana, Tex. to J. E. Metcalfe & Son, Corsicana. Estimated cost $32,000.

Ice Plant — T. V. Lawson, 326 Cumberland Rd., San Antonio, Tex., is receiving bids for the construction of a 30 ton ice plant at 15th and Brook Sts. Estimated cost $30,000.

Ice Plant—Lowell Ice Co. Inc., 30 Carney Sq., Lowell, Mass., awarded contract for the construction of an artificial ice plant at 39-41 Middlesex St. to J. A. Simpson, 174 Central St., Lowell, Mass. Estimated cost $200,000.

Ice Plant — Metropolitan Ice Co., 321 Washington St., Somerville, Mass., awarded contract for a 1 story ice plant at Watertown to Vappi & Ferguson, 515 Massachusetts Ave., Cambridge, Mass. Estimated cost $40,000.

Ice Plant—Mission Ice Co., H. G. Terry, 226 Rivas St., San Antonio, Tex., awarded contract for the construction of a 30 ton ice plant to E. A. Huebner, Moore Bldg., San Antonio. Estimated cost $45,000.

Ice Plant—J. Welborn, Geary, Okla., is having plans prepared for the construction of a 15 ton ice plant at Seiling, Okla. Estimated $25,000. Private plans.

Beef Killing Plant—Roth Packing Co., Waterloo, Ia., awadred contract for the construction of a beef killing plant to Jens Clesen & Sons Construction Co., 1670 Sycamore St., Waterloo. Estimated cost $47,600.

Packing Plant—Escondido Lemon Association, Escondido, Calif., is having plans prepared for a 2 story, 150 x 160 ft. packing plant. Estimated cost $140,000. J. R. Murray, 1213 University Ave., San Diego, Calif., is architect.

Packing House Plant—F. G. Vogt & Sons, 30th and Race Sts., Philadelphia, Pa., plans the construction of a packing house plant at 36th St. and Grays Ferry. Estimated cost $1,000,000. C. B. Comstock, 110 West 40th St., New York, N. Y., is architect.

Packing Plant—Placentia Mutual Orange Association, Placentia, Calif., awarded contract for a 1 and 2 story packing plant to E. M. Wheatland Construction Co., Whittier Blvd., Whittier. Estimated cost $75,000.

Packing Plant — Zummo Packing Co., F. L. Zummo, Pres., 710 College St., Beaumont, Tex., plans the construction of a 2 and 3 story packing plant in Jefferson County, capacity 200,000 head of hogs and 15,000 head of cattle in addition to sheep and goats. Estimated cost $125,000.

Packing Plant Addition — Swift & Co., Pacific and Davis Sts., San Francisco, Calif., is having plans prepared for a 2 story, 50 x 100 ft. addition to packing plant, to include refrigeration plant and warehouse at Modesto. Estimated cost $75,000. Private plans.

Packing Sheds, etc.—Tidewater & Southern Ry., Mills Bldg., San Francisco, Calif., is having plans prepared for a freight depot and four packing sheds for handling fruit and vegetable shipments at South Broadway and B. St., Turlock. Estimated cost $45,000. Private plans.

Sugar Refinery — American Beet Sugar Co., c/o F. J. Kasper, Mgr., Rocky Ford, Colo., plans the construction of a beet sugar refinery at Monte Vista, Colo. Estimated cost $500,000.

Tea and Coffee Factory — Widlar Co., C. W. Brand, Pres., 722 Bolivar Rd., Cleveland, O., is receiving bids for a 3 story, 100 x 280 ft. factory on Berea Rd. Estimated cost $250,000. H. E. Shimmin, Bulkley Bldg., Cleveland, is architect.

Liquor Warehouse—Hiram Walker & Sons Ltd., W. T. Hume, Mgr., Walkerville, Ont., awarded contract for a 10 story, 150 x 173 ft. liquor warehouse on Sandwich St., to Gosselin Construction Co., 487 Ouellette Ave., Windsor. Estimated cost $300,000. Equipment for handling liquor will be installed.

Wine Storage Building—Jordan Winery Co., W. J. Aikens, Mgr., Jordan, Cnt., is having plans prepared for a 2 story, 165 x 198 ft. wine storage building, 2,000,000 gal. capacity. Estimated cost $150,000. R. McDonnell, 517 Lister Bldg., Hamilton, Ont., is architect. Special tanks and handling equipment will be required.

Winery Addition — Stamford Park Co., Stamford, Ont., is having plans prepared for a 1 story, 60 x 100 ft. and 57 x 111 ft. addition to winery. Estimated cost $50,000. N. Mann, 1950 Main St., Niagara Falls, Ont., Archt.